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USSR Report

ENERGY

No. 12

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ELECTRIC POWER

PLANS FOR FURTHER ENERGY PRODUCTION SOURCES

Kishinev KOMMUNIST MOLDAVII in Russian No 1, Jan 80 pp 57-61

[Article by G. Chalyy, corresponding member, Moldavian SSR Academy of Sciences: "Power Engineering Today and Tomorrow"]

[Text] In modern society, the basis of the foundations for all branches of the national economy, science, culture and our daily lives is power engineering. Its value is growing by leaps and bounds today, in this period of rapid scientific and technical progress.

Of all the forms of energy used by man for his basic needs, the one that is being developed most rapidly is electricity. Whereas the production of all types of output throughout the world has doubled in about 25 years, the consumption of electricity has done so in less than 10. In the period from 1900 to 1975, the amount of electricity generated throughout the world increased by a factor of more than 700. By the year 2000 the consumption of electricity will increase to 30-31 trillion kWh per year!

In our country, development of the energy base is a matter of primary importance. Priority is given to electricity, the production of which is increasing at a tempestuous rate. As the result of the fulfillment of its Leninist electrification plan, in 1937 the Soviet Union--which, according to this indicator, had occupied one of the last places in the world in the first years of its existence--surpassed such countries as England, France, Italy and Japan in the production of electricity. By 1976 we were already generating more electricity than France, England, the FRG, Italy, Sweden and Austria put togather. Right now, up to 4 billion kWh of electricity is generated every day in the USSR; this is half the annual amount specified by the GOELRO [State Commission for the Electrification of Russia] plan right after the October Revolution.

This branch is also being developed rapidly in the union republics, and in many of them electricity production is increasing faster than for the country as a whole. Achievements in the field of electrification are particularly visible in Soviet Moldavia, which was the last to enter the USSR's family of fraternal peoples. In the pre-Revolutionary years the capacity of all its electric power stations was less than 1,000 kW, while per capita consumption of electricity was only thirty-third of the average for Russia as a whole. There are now a number of electric power stations operating in the republic, including the large Moldavskaya GRES and the Kishinevskaya TETs, which have a large total capacity. This makes it possible to cover completely the requirements of the national economy and the people's domestic needs. All the kolkhozes and sovkhozes are connected to the power system's networks and the electrification of all populated points in the republic has been completed.

A centralized heat supply system for industrial and domestic consumers has been organized on the basis of TETs's and large regional boiler rooms. When the Moldavskaya GRES went into operation the power system achieved a high capacity and there appeared the possibility of transferring part of the electricity it generates into the Integrated Power System for the Southern USSR and to the fraternal country of Bulgaria. In the future, the increasing requirements of the republic's national economy for electricity will be covered by enlarging the capacities of the Moldavskaya GRES and Kishinevskaya TETs-2, as well as by the development of trunk electrical links with the Integrated Power System for the southern part of the country.

Power engineering in the Soviet Union has its own characteristic features that are dictated by the continuous and large-scale increase in the need for electricity. They include an increase in the capacity of electric power stations and the units installed in them; the use of the highest possible voltages in trunk lines for the purpose of increasing their transmissive capacities to the maximum; the organization of large, integrated power systems.

In Moldavia, by the beginning of 1979 we had in operation more than 60 electric power stations with capacities of more than 1 million kW, including 26 with capacities greater than 2 million kW. Electric power transmission lines carrying 500,000 and 750,000 v of alternating current and 800,000 v of direct current are in use, and we are mastering the use of lines capable of carrying 1,150 kV of alternating and 1,500 kV of direct current. The next few years will see the completion of the creation of this nation's Unified Power System, which will join together all the electric power stations from the USSR's western boundaries to the Trans-Baykal. The Soviet Union's Unified Power System is already the largest power association in the world, and contains about 800 electric power stations with a total capacity of more than 200 million kW. It produces more than two-thirds of all the Soviet Union's electricity.

The plans for the further development of power engineering for this country, as determined by the 25th CPSU Congress, are far-reaching ones. In 1980 at least 1.265 billion kWh of electricity must be produced in this country. In order to reach this goal it is necessary to provide a substantial increase in the rate of introduction of new capacities. During the last year of the 10th Five-Year Plan we will put into operation power-producing units with a total capacity of 14.5 million kW.

The greatest amount of development has been done on hydraulic thermal (using mineral fuel) and atomic electric power stations. Hydroelectric power stations are the simplest and most highly perfected installations for the production of electricity. Although the capital investments for their construction are greater than those for thermal stations, the cost of the electricity they produce is considerably lower. Many hydraulic engineering complexes also have a large and integrated effect on the national economy: in their "speheres of influence" we find, as a rule, large-scale industry and intensive development of agriculture and other branches.

Some of the largest hydroelectric power stations in the world have been built in the Soviet Union: Krasnoyarskaya on the Yenisey River, Bratskaya and Ust'-Ilimskaya on the Angara, Volzhskaya imeni 22d CPSU Congress and imeni V.I. Lenin on the Volga. The Sayano-Shushenskaya and Boguchanskaya GES's are under construction and plans have been completed for the Sredne-Yeniseyskaya, Osinovskaya and Igarskaya GES's, which will be the largest in the world. The plan for the Nizhne-Lenskaya GES is being developed.

Plans are being made for the gradual but complete "restraint" of all the large and medium-sized rivers in this country during this decade. The possibilities of the Volga, Dnepr, Irtysh, Don, Dnestr, Tuloma, Narva, Neman, Kura and many other rivers will be utilized. The great rivers of Siberia are especially promising from the viewpoint of power engineering, as well as the Pyandzh, Naryn and (particularly) Vakhsh mountain rivers, which surpass the Volga in their power engineering possibilities (and the Vakhsh surpasses even the Angara and the Yenisey). The huge reservoirs that will be created on these rivers will make it possible to irrigate many millions of hectares of land in the southern Tadzhik, Uzbek, Turkmen and Kirgiz SSR's.

Nevertheless, at the present time the main role in our power supply system is played by thermal electric power stations. Despite the very low efficiency of the entire production cycle and the substantially higher cost of the electricity that is generated, thermal electric power stations were favored for development because they are much cheaper and their construction takes considerably less time. Right now there are more than 50 thermal electric power stations with capacitites of more than 1 million kW in operation in this country, including the Zaporozhskaya, Uglegorskaya and Krivorozhskaya GRES's. The capacities of the Lukoml'skaya, Kostromskaya and Moldavskaya GRES's, among others, will be increased significantly in the next few years. The creation of the largest thermal and power engineering complexes in the world has begun in the areas of the Ekibastuzskiy and Itatskiy coal fields, where the construction of five 4-million-kW and ten 6.4-million-kW thermal electric power stations is being planned.

The USSR occupies the leading position in worldwide power engineering in the field of district heating systems. The total capacity of our heating plants (thermal electric power stations at which both thermal and electrical energy are generated) is about one-third of all thermal electric power stations, and they supply heat and electricity to more than 800 large cities throughout the country. In addition to providing a high degree of economy, a heating plant makes it possible to eliminate numerous boiler rooms, which has a very substantial effect on improving the ecological state of the air basin around cities.

As is the case in hydraulic power stations, in thermal electric power stations there has been an increase in the unit capacity of the individual power-generating units. The largest single-shaft power-producing unit in the world, with a capacity of 1.2 million kW (this almost equals the total capacity of all the electric power stations built under the GOELRO plan), is now being assembled at the Kostromskaya GRES. The use of the phenomenon of superconductivity in turbogenerators opens new possibilities for achieving a substantial increase in the unit capacity of electrical machinery.

A new era in power engineering throughout the world began with the emergence of the possibility of producing electricity by the use of atomic energy. As A.P. Aleksandrov, president of the USSR Academy of Sciences, stated, this means that "the sword of Damocles of a fuel shortage, which was threatening the development of material culture in the comparatively near future, has been sheathed for a practically unlimited length of time." The fact of the matter is that--according to calculations made by specialists--even if we only maintain our present rates of development of power engineering, the reserves of "normal" (mineral) fuel will not last much longer.

Therefore, scientists have engaged in an intensive search for a fundamentally new type of fuel. Today, that fuel is uranium. This new era in power engineering began on 27 June 1954, with the Soviet atomic electric power station in Obninsk that was the first one in the world. Following it, the Sibirskaya, Beloyarskaya, Novovoronezhskaya, Leningradskaya, Kurskaya and other atomic electric power stations were built. By the beginning of 1979 their power constituted 3 percent of the total power generated by all the electric power stations in this country.

Atomic power engineering is quickly becoming one of the leading fields in that branch. In the near future it will be responsible for the basic increase in generating capacities, particularly in those regions where there is a deficit of organic fuel and hydraulic resources. At the present time we are seeing an intensive increase in the capacities at existing atomic electric power stations and the construction of new ones.

During this five-year plan AES capacities in the amount of 13 million kW will be introduced. This will make it possible to save 24 million tons of mineral fuel this year alone. The new atomic electric power stations will be equipped with large power-producing units. In the next 10-12 years the total capacity of the atomic electric power stations in our country will be raised to 100 million kW. The widespread introduction of atomic energy for the heating of cities and residences and for the most diversified technological processes will begin soon.

Another prospective direction for the development of large-scale power engineering is the creation of thermal electric power stations with so-called "magnetohydrodynamic generators" (MGDES), where thermal energy is converted into electricity without the use of any rotating parts. The use of magnetohydrodynamic units in conjunction with standard ones already has made it possible to raise their efficiency to 50 percent, and in time--the specialists say--it can even be raised to 60 percent (the coefficient of fuel utilization in steam-turbine and atomic electric power stations does not exceed 40 percent). The first (and so far the only) experimental industrial MGDES in the world was set into operation in the USSR in 1975, in the Mosenergo [Moscow Regional Administration of Power System Management] system. A main unit for an electric power station with magnetohydrodynamic generator having a total capacity of half a million kilowatts has been designed.

However, the highest hopes for saving mankind from "energy starvation" are being placed on the utilization of the possibilities that might be provided by a controlled thermonuclear reaction. If man could learn how to "restrain" it, he would obtain a practically unlimited source of energy. In the reaction that occurs during the fusion of deuterium nuclei (heavy hydrogen, which is present in ordinary water), a colossal amount of thermal energy is realeased--10 million times more than is released by burning an equal weight of coal. This means that the amount of water contained in a cube only 160 meters on a side can yield as much energy as is obtained by the normal burning of all the mineral fields extracted throughout the entire world every year! Another important point is that radioactive contamination of the environment will be almost completely eliminated, since the final products of the "combustion" of deuterium are harmless. Concrete results that allay doubts as to the successful solution of this problem have already been achieved.

Finally, of course, the use of the sun's energy has always been and remains extraordinarily alluring. It really is the source of a colossal amount of "free" energy. The direct conversion of solar energy into electricity is both simple and easy: it is done with the help of "photoelements," which are plates of singularly pure monocrystalline elements. For the stable production of any significant amount of electricity, however, the units that capture the sun's rays must cover a huge area, which would be economically (today, at least, given the present technological capabilities) unjustified.

While solar energy is still being used on a limited but extremely successful basis in spacecraft and other devices, in remote regions it is being used quite widely for direct conversion into electricity and as an additional source of thermal energy. In this respect, solar installations in our southern regions are exceptionally feasible. They can be used to heat water and soil, hotbeds and residences, air conditioning, water desalinization and the raising of water from wells, drying fruit and so on.

Power engineering--primarily electric power engineering--is the foundation of the economic system, as has already been stated. At the present time in almost all branches of industry all the machine tools, rolling mills, blooming mills, mine elevators and lifts, pumps and other equipment are driven by electric motors. The most convenient, economical and ecologically "cleanest" form of transportation is electrical: trolley, subway, electric train and electric truck. The power-worker ratio is increasing from year to year. Electrification facilitates the introduction of the most modern, highly productive machinery and the integrated mechanization and automation of production processes.

The level of the use of electricity in agricultural production is also high. In Moldavia, for example, many kolkhozes and sovkhoz-plants use 5-6 and even 10 million kWh each year. This is almost double the consumption for all agricultural work in the republic in 1950.

Because of electricity's low price, the areas of its use in science, culture and domestic life have expanded almost inconceivably. Almost all scientific equipment--all sorts of devices, instruments and installations--works on this form of energy. With its help it has become possible to create spacecraft and interplanetary stations and carry out flights with them, create automated control systems for scientific research and production, and so forth. Without electricity, these days we could not conceive of lighting residences, streets, production facilities and places of entertainment. It is also used to operate television sets and radios, refrigerators and washing machines, tape recorders and air conditioners.

In the future the sphere of utilization of electricity will grow even larger. There will be significant increases in the scope of its use in the areas named above and a number of other traditional fields. At the same time, attention is being turned to accelerating and expanding the electrification of technological processes, particularly in metallurgy and the chemical industry. The electrification of stationary processes in agricultural production and the development of new complexes of machine operating on electricity (including tractors) will proceed on broader scales and at more rapid rates. Its use for the creation of more favorable conditions for crop development and the mechanization and automation of farms, as well as other areas of agriculture, will be expanded greatly.

In connection with the tempestous growth of this country's national economy, the need for electricity is steadily increasing. No matter how great our successes in producing it, we still do not have enough electricity. This, as the November (1979) Plenum of the CC CPSU pointed out, is the basis for our goal of developing this branch more rapidly. This must be achieved by accelerating the construction of new and the modernization of existing electric power stations, improving significantly a number of parameters of the turbines and other electrical equipment that is being built, and reducing the electricity losses in the network to a minimum.

At the same time, the question of intensifying electricity and fuel economy conditions is becoming an urgent one. The Moldavskaya GRES alone burns

17,800 tons of coal (equal to six or seven large trainloads) and 2,500 tons of fuel oil every day. The production of a single kilowatt-hour of electricity requires an average of about 360 grams of fuel at thermal electric power stations, and reducing this consumption rate at all the thermal electric power stations in the Soviet Union by a single gram will result in a savings of about 1 million tons of fuel per year. Reducing the electricity losses in the shared-use electrical networks in this country by only 1 percent would be the equivalent of generating an additional billion kilowatt-hours of electricity per year.

Therefore, concern over maximum fuel and electricity economy on a day-to-day basis, both in branches of the national economy and domestic life, must immediately become a matter of national importance.

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ENERGY CONSERVATION

IMPROVING POWER GENERATING FACILITIES IN GEORGIAN SSR

Moscow MATERIAL'NO-TEKHNICHESKOYE SNABZHENIYE No 9, Sep 79 pp 36-38

[Article by Yu. Chediya, Director of Georgian Main Electric Power System: "Today, Tomorrow and Always"]

> [Text] A decree of the CPSU Central Committee and the USSR Council of Ministers appeared recently "On Providing the National Economy and the People with Fuel, Electrical and Thermal Energy in the 1979/1980 Fall and Winter Period." This is a mobilizing document which defines a specific program of actions to conserve these most important resources in the near future. Today we discuss how this program is being realized in one of the regions--Georgian SSR.

Georgia, without exaggeration, can be called a country of "white coal." Economically efficient hydroelectric power resources here are estimated at 32 billion kWh. However, little more than 10 percent of them are used. Under conditions of a deficit of fuel and power resources the maximum and rapid utilization of hydroelectric power resources is a most important and high-priority task. Great projects have been developed in this area in recent years: in 1978 three units of the Ingurskaya GES started up. With the introduction of the remaining two units in 1979-1980 the output of the GES will reach 1.3 million kW with annual production of about 5 billion kWh. Construction of the Khudoni GES was begun on the Inguri river with a capacity of 750 thousand kW, and next will be the Namokhvashi GES on the Rioni river.

However, today the main power of the republic is supplied by the base thermal electric power stations, which produce about 70 percent of all the electric power, and up to 75 percent in the winter period which is more tense with respect to fuel. They consume about 3 million tons of conventional fuel per year, including about 2.5 million tons of the highest quality fuel--gas and fuel oil.

Given such a large scale, the elimination and reduction of non-productive losses of fuel or steam, even in the smallest quantities, yields a large savings. This is true for the Tbilisi GRES to a large degree. It consumes about 95 percent of the gas and liquid fuel used in the Georgian electric power system. This station sets the standard in its conservative demand. Soon after introduction of the last power plant with a capacity of 160 thousand kW it met the design values and for many years it has been firmly holding the course set in this direction. However, to preserve the positions attained is becoming more and more difficult: the equipment is aging, which is accompanied by an increase of non-productive losses due to all kinds of leaks, steam losses, etc; the efficiency of equipment and mechanisms is deteriorating. The increasing stress on the control operating conditions of the power units is no less serious and is an ever more dominating factor. They work in changing uncalculated and uneconomical regimes more and more frequently, which makes good organization difficult.

In such circumstances one thing is especially important--try anew to solve problems, which for a long time have seemed insoluble and which have seriously lowered the economy of power plant installations, namely: fight contamination of condenser tubing and the rear surfaces of hot water heaters. Much inventiveness, persistence and patience were necessary before the simplest and most reliable versions could be selected; ones which would allow effective cleaning of contaminated surfaces without stopping the equipment, and actually without changing the mode of operation. A water monitoring unit has been developed for the cleaning of condenser tubing which permits one to clean the inner surfaces of all the tubes by means of a high-pressure stream in a period of 1.5-2 hours. There is already a suggestion to automate the unit, which would permit constant cleaning of the tubes of which there are about 11 thousand in each condenser. Such a unit has been tested and is now in operation on one condenser. If it is introduced on all power plants no less than 15 thousand tons of conventional fuel will be added to the fuel tank, which is equivalent to an additional output of more than 40 million kWh of electrical energy without fuel consumption.

Cleaning of the rear surfaces is being introduced by the aid of a thermal pulse unit, in which dynamic actions of a gas and air stream with organized microblasts in it are used. This will also yield a savings of about 15 thousand tons of conventional fuel.

The participation of shifts, brigades and other production collectives and subordinate units in increasing economy in the use of fuel and energy is taken into account when determining the results of socialist competition and in awarding prizes. A carefully developed system of criteria and methodology for evaluating the contribution of each participant are used for this purpose, and field tests of the efficiency of equipment operation have been adopted.

Intensive projects for redesigning and modernizing equipment have been introduced in recent years. Thus, a new turbogenerator with a capacity of 110 thousand kW has been introduced at the Tkvarchel'skaya GRES, which has made it possible to remove the obsolete equipment and save about 80 thousand tons of conventional fuel in one year. About 600 million kWh of electrical energy are made from local fuel, which permits a savings of about 200 thousand tons of high-quality fuel oil. Two boilers have been modernized at the Tbilisi TETS, resulting in a doubling of their steam production and an efficiency increase of 3-4 percent.

But, in spite of all these measures, according to the basic index of efficiency in the use of fuel--its unit consumption for the electrical energy produced (it reaches 370 g per 1 kWh in the republic)--the Georgian electric power system is greatly inferior to the majority of other power systems, although a savings on the order of 10-12 thousand tons of conventional fuel is achieved here yearly in comparison with the plan. The major reason for such a discrepancy lies in the specifics of the power system: the relative significance of the production of electric energy by the most effective method, the combined method, is insignificant, when heat is being supplied simultaneously (in our republic it is 0.5 percent of all with the overall union level more than 20 percent), and in the absence of modern equipment, which is made to work at supercritical parameters.

Вопрос об экономии электроэнергии
мы проакцентировали

Key: We've aired the question of saving
electrical energy

There are plans to modernize all three turbines at the low-capacity existing TETS in Tbilisi and convert them to the so-called counterpressure regime, which completely eliminates steam loss into the condenser. There are practically no other substantial ways of improving the use of fuel for TETS.

The problem of increasing the efficiency of the use of fuel and energy resources in the republic, naturally, is not limited to "large" power engineering. About 65-70 percent of high-quality fuel is burned in commercial and heating boiler and other fuel-consuming installations. The most common shortcoming at the majority of enterprises is the small scope of standardization of the consumption of fuel, heat and electrical energy both of the end products and of the separate technological processes, and also the lack of specialized in-plant organizational structures, which could accomplish optimization of operating regimes of energy-consuming installations. Selective inspection indicates that, with proper organization of operations unit efficiencies of 5-10 percent can be attained without capital expenditures.

Because of the depletion of fossil fuel reserves and the expense of their extraction, enrichment and delivery, the use of every possible low-potential sources of energy, such as the heat of thermal waters, in which our republic is rich, slightly heated sea and spring waters, and also unlimited solar energy are coming to be more important. However, regardless of the fact that the problem of using these kinds of renewable energy has come up time and again, that there are solutions to their utilization, and that commercial test models of power installations have been developed, on the whole one can consider this problem unsolved. In this respect the story of industrial introduction of a heat pump installation, whose scientific bases of application have been carried out by scientists of the GruzSSR Academy of Sciences, is quite instructive. Such an installation, which uses the heat of sea water, has been in use in Pitsunde for many years. VNIPIEnergoprom [All-Union Scientific Research and Design Institute of the Energy Industry] together with the Georgian Polytechnical Institute imeni V. I. Lenin has developed an original arrangement for the heat supply of the health resort of Tskhaltubo by the aid of a heat pump installation based on the heat of local sources. However, introduction of this economical system is not envisaged for the near future. At the same time it is known that in the USA about one million heat pump installations are in operation currently, including many individual ones. A decisive shift in this area is possible with the intervention of the USSR Gosplan.

A special, permanent commission has been created at Gruzglavenergo for the purpose of augmenting the economy of fuel and energy resources. The commission has developed a set of measures for increasing the efficiency of fuel and energy consumption on the basis of an analysis of the use of fuel and energy at enterprises of the republic. These recommendations are in agreement with the Gosplan of the republic and have been distributed to all enterprises for their adoption. According to the calculations of specialists, the realization of the organizational and technical measures should yield a great savings.

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NATURAL GAS CONSERVATION MEASURES IN GEORGIAN SSR

Moscow MATERIAL'NO-TEKHNICHESKOYE SNABZHENIYE No 9, Sep 79 pp 38-40

[Article by A. Andzhaparidze, first deputy director of Georgian SSR Main Administration of the Gas Industry: "Strict Accounting for Blue Fuel"]

[Text] Georgian SSR is a large consumer of natural gas. Billions of cubic meters of the gas are burned at enterprises of the republic every year. Thus even a small savings by each of them will produce a significant addition to the fuel budget.

Systematic thermal engineering experiments, the proper organization of heating installations, and development of systems charts of the optimal parameters for equipment will encourage the rational and economic utilization of fuel to a large degree. In 1978 such steps were taken at 76 enterprises of various branches of the national economy of the republic. The annual savings was 2.6 thousand tons of conventional fuel.

Work on sound norm setting for consumption of fuel, thermal energy and electrical energy appears to be quite effective. As a result of such efforts at enterprises of the republic in the past year about 1.5 thousand tons of conventional fuel and 350 thousand kWh of electrical energy were saved.

Measures for optimization of schedules for gas deliveries to enterprises and residents are being systematically applied, which assures rational utilization of gas and adherence to established limits.

Every year enterprises of the republic prepare for work during the fall and winter seasons. This includes measures for organizing and repairing auxiliary fuel devices, making necessary changes in gas delivery schedules for enterprises and other customers based on established consumption limits.

Advanced technological processes have been developed and introduced in the management of repair operations on gas pipelines and gas equipment, which permits shorter repair times and enables the repairs to be done without reducing pressure in gas pipelines and without closing them off. The technological losses of gas in 1978 were reduced by 530 thousand cubic meters due to these efforts. This was equal to a savings of 620 tons of conventional fuel.

Public inspections of the efficiency of the utilization of fuel and energy resources are conducted yearly in the republic, which helps to bring about large reserves.

A highly effective measure is the organization of accounting for consumption of fuel and energy resources. Of course, this requires installation of gas flowmeters and constant inspection of their operation, which creates a reliable basis for checking has consumption and adherence to normal gas delivery schedules. Arrangements for repairing gas meters have been set up.

Permanent commissions, whose functions include development of measures for rational utilization of gas at enterprises located in their service area, and monitoring fulfillment of these measures, have been created in all sections of the Georgian SSR Main Administration of the Gas Industry. An effective means of controlling squandering of gas is the addition of taxes for consuming fuel in excess of the limits.

Organization of a reliable and rapid communications with the sections plays an important role in the economic use of gas. A teletype line between the Central Dispatcher Administration of the Main Administration of the Gas Industry and the gas producers has been set up which permits rapid changing of gas delivery schedules depending on the situation at local sites.

We constantly check on gas consumption at enterprises of the republic. Recently we monitored a number of large enterprises--industrial, agricultural and residential ones. A number of shortcomings were revealed, elimination of which will permit a savings of 5.5 thousand tons of conventional fuel.

In the course of this investigation instances of neglect characteristic of the majority of enterprises were revealed. In many places schedule charts of optimal parameters for equipment operations and technically sound norms for fuel consumption for the goods being produced were lacking; equipment was not fitted with automatic regulation of combustion processes, and heating units lacked the necessary fuel consumption control and measuring devices. Windows in many locations and boilerworks were broken.

There is excessive consumption of gas at a number of enterprises, where the tally runs to millions of cubic meters. Among the "spendthrifts" are the Rustavskiy Chemical Combine, the Georgian Republican Administration "Vtortsvetmet," the Agarskiy Sugar Combine, and the Gardabanskiy Roofing Material Plant.

Some manage to consume gas without funds--the Nacharmagevskiy Vegetable Sovkhoz and organizations of the republican ministeries of education and health protection.

A number of enterprises can be mentioned, whose directors care little for preparation of reserve fuel sources: the electric welding equipment plant of the trust "Inzhstroy," the combine of industrial enterprises of the trust "Zaktransstroy," the heating station of the Tbilisi Fuel Management Administration, and the Avchal'skiy Glass Plant.

The plant of champagne wines, "Gruzsel'mash," and the Concrete Materials Plant No 1 of Gruzstroyindustriya have set up an unsatisfactory system of gas consumption accounting. Their calculations are incorrect, and they do not perform the state inspection at the established times.

A number of enterprises do a poor job of recording operating parameters of heating equipment, do not record the temperature of exhaust gases, do not measure the hardness and alkalinity of boiler water--all this leads to excessive consumption of natural gas.

A characteristic shortcoming is incorrect compilation of readings on forms 11-sn and 4-sn. As a rule, enterprises adjust amounts to scheduled values, use lowered calory equivalent for translating to conventional fuel, and improperly indicate consumption based on unstandard consumption norms, etc.

At many enterprises heating units are used without heating regime charts, but even where they do exist, frequently they are not heeded and the water temperature increases excessively, for example at heating stations of Tbilisi. As a rule, orders for natural gas are made according to statistical data and without an engineering basis.

Little attention is paid to the condition of equipment which uses fuel, but in many cases there is a significant loss of heat through the plating, poor heat insulation, air holes, etc. For example, at the Avchal'skiy Glass Plant the tank furnace is in serious disrepair, at the fat combine the boiler is bad, and at many heating stations the pipelines are in need of major repair.

In our opinion industrial and residential consumers must use less gas until they fulfill a number of conditions. Technically sound norms of fuel consumption must be adhered to, which have been established by industry specialized organizations, reserve fuel accessibility must be prepared in conformity with the project, and rapid conversion to the reserve kind of fuel should be assured. In addition, there must be regime charts for each unit of fuel-consuming equipment and automatic regulation of the gas combustion process. This program is a minimum.

And there is another set of problems which must be solved. According to the plan for distribution of natural gas to ministries and departments of the republic which was confirmed by the GruzSSR Gosplan, gas for the inhabitants and for municipal and everyday needs is sent to ispolkoms of the Councils of People's Deputies of Tbilisi, Kutaisi and Yugo-Osetinskaya Autonomous Oblast. For the remaining cities and inhabited localities funds go to the

Ministry of Housing and Municipal Management of the republic, which distributes them only to units and residences of the local Soviets which are in its jurisdiction. Therefore, the departmental municipal and everyday locations, and also residences, which are personally owned, are without funds for gas. For example, there is no allowance made for commitment of funds for Sachkhere, Marneuli, Madneuli, Kachreti, Teleti and for 20 villages. The GruzSSR Gosplan does not provide funds for the Ministry of Culture, the Ministry of Agriculture, the Ministry of Water Management, the State Committee for Agricultural Engineering, for administrations of everyday services for the Tbilisi residents and of the Yugo-Osetinskaya Autonomous Oblast. This causes confusion in the distribution and assured receiving of funds by gas-consuming facilities and its impairs monitoring of gas consumption.

It seems that it would be better for natural gas funds to be allotted with the breakdown based on city blocks: to local soviets for municipal and everyday needs independently of departmental affiliation, for residents according to numbers; to ministries and departments according to industrial and heating needs and for municipal and everyday purpose boiler rooms with capacity above 20 Gcal/h. It is best to allot funds separately for production of thermal energy to local Soviets, ministries and departments of GruzSSR.

Probably the introduction of such an order will improve the gas supply of consumers and will permit better monitoring of gas consumption at enterprises and organizations of the republic.

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ENERGY CONSERVATION

INCREASING EQUIPMENT, PIPELINE INSULATION TO SAVE ENERGY

Moscow MATERIAL'NO-TEKHNICHESKOYE SNABZHENIYE No 9, Sep 79 pp 42-43

[Article by M. Kaplan, engineer: "Don't Let Heat be Lost"]

[Text] There is practically no technological process which does not use fuel, steam, hot water or electric energy. Therefore, even a small savings will yield a significant result in the country as a whole.

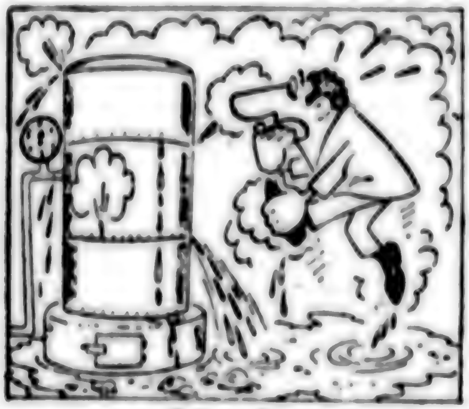
The largest consumer of fuel--Minergo SSSR [USSR Ministry of Power and Electrification], gets almost half of the fuel as its portion. A reduction in its consumption of only 1 g per released kWh (this is about 0.3 percent of current consumption) is equivalent to production of more than 1 million tons of conventional fuel given the current volume of electrical energy production. One of the effective, but insufficiently used methods of saving fuel is saving heat by means of reliable insulation of heat-emitting surfaces of equipment and pipelines.

Exposed surfaces give off each hour into the surrounding air 4400 kcal at heat-carrier temperature of 250°C and 23,000 kcal of heat at a temperature of 550°C from each square meter. This consumes hourly approximately 0.7 kg and 4 kg of conventional fuel. Thus, if the total heat releasing surface, for example, of a power unit with a capacity of 300 thousand kW is 70 thousand square meters, the fuel losses are as much as 150 tons of conventional fuel per hour. Of course, this is intolerable. Insulating steam lines, which have a temperature of 540-550°C, with 1 cubic meter of effective insulation materials will permit one to reduce heat loss by approximately 80 thousand cal. The fuel savings in this case is 14 kg/h, and for the entire service life of the insulation it is up to 50 tons of conventional fuel. Based on estimated prices the cost of the fuel saved is 500 rubles, and the insulation is 160-170 rubles for 1 square meter "in practice." The actual effectiveness of heat insulation is much higher, for expenditures on fuel recovery is higher than current or estimated prices in many regions of the USSR.

Effective heat insulation of equipment justifies itself even when there is a very low fuel extraction cost, for example at open coal workings in Siberia.

One must also consider the very important role of heat insulation in assuring good working conditions at work stations and in reducing heat pollution of the environment.

There are a number of standards in industrial construction, which set the amount of permissible heat losses through insulation for a given kind of structure, equipment, or heat carrier. According to norms of Minenergo SSSR for TES and of Minmontazhspetsstroya SSSR [Ministry of Installation and Special Construction Work] for petrochemical and other industrial equipment heat losses through insulation should not exceed a specific amount, which corresponds to fuel consumption of 50 g.



Гейзер бесхозяйственности

A geyser of mismanagement

Such "standard" losses for TES of Minenergo SSSR annually are: for heat--15 million Gcal, and for fuel--up to 2 million tons of conventional fuel.

In fact, these losses are 2-3 times higher than the norms at many electric power stations, and they are 60 percent higher on average. Insofar as the methods and devices used permit one to take measurements of heat flows only at separate points, and under specific conditions (remote from seams between parts, from heat-conducting circuits, from external air flows), the distribution of such probes over the entire heat-releasing surface of the insulation leads to a substantial lowering of the total amount of the losses. The influence of heat release from exposed parts of equipment is also not taken seriously enough, especially for fittings, and also for connected, auxiliary pipelines, which frequently are left without insulation in "economy" circuits.

The sharp increase of fuel costs in the world market have led to reexamination of current norms and the practice of calculating heat insulation in a number of countries. Now it is considered economically advantageous to increase the thickness of insulating layers or the use of more costly and effective materials for reducing heat losses up to 100-150 kcal/(square meter per hour).

This is possible by the use of high-quality heat-insulating materials and parts, which have low coefficients of thermal conductivity, especially at high temperatures, which are vibration-stable, and which are convenient to install and which preserve their original features during use for the insulation service life, which should be no less than the service life of the equipment being insulated, i. e. 7-8 years.

Industry is so far not providing consumers, especially TES, with the necessary high-temperature insulating parts. Plants, which manufacture insulation, are subordinate to numerous union, republic and local departments and organizations. Their output is usually not great and their technical level is not high. The largest capacity enterprises are under the jurisdiction of Minpromstroymaterialov SSSR [Ministry of the Construction Materials Industry], Minmontazhspetsstroya SSSR and Minenergo SSSR. Principally, they make the mineral and slag wool and articles from it: slabs, shells and sewn mats in various casings. Articles of each kind are made in three or four brands which differ in size, coefficient of thermal conductivity, fiber diameter, etc. Brands with higher numbers frequently have poorer thermophysical indices, although their price is substantially higher. In such cases it is more profitable for the manufacturing plants to make articles of high quality: it is easier to fulfill the plan "under fire." The use of more expensive articles is also profitable for installation organizations, because their volume of completed projects increases, which depends on the cost of the materials and articles used. The national economy is the loser, for it receives physically less articles at a higher price. But this is not all: their use leads to an increase of heat losses and a shortening of the insulation service life, growth in demand for insulation materials, and an increase in expenditures for repairs.

During a reexamination of standards for rock wool and articles made from them, which was carried out in 1976, the "heaviest", i. e. the poorer brands were excluded, but the number of brands did not change, their indicator did not improve, and for some reason they even got worse. Recently introduced brands of wool and articles in the highest category of quality have the same indices of thermal conductivity, although they differ in a number of other physico-mechanical properties. All this does not encourage reduction of losses of heat and fuel.

Thus, the state of heat insulation of industrial heat-releasing equipment does not meet modern requirements in its technical level in many cases. The low quality of slag articles and the inadequate production volume of effective lime and siliceous articles and of fibrous articles made from natural mineral materials do not permit assurance of a standard level of heat losses for equipment and they make it difficult to take steps to reduce them in the national economy.

Lowering the norms of heat losses by 10-15 percent would permit one to decrease specific expenditures for fuel in industrial production, in particular in heating plant installations by 1 g per 1 kWh. This would mean millions of tons of fuel per year.

The possibilities are real. To do this there must be an expansion of production of heat-insulating rock wool articles, which are manufactured on a base of fiber, obtained from a natural raw material: diabase, basalt, kaolin, etc. Finally, plants which make articles of lime-siliceous materials must be started up. This was envisaged by the plan of Minenergo SSSR in the 9th Five-Year Plan in order to increase the technical level of production of heat-insulating articles made from slag wool, and to substantially improve their thermophysical indicators. It seems that it is now time to reexamine the norms for heat insulation for TES, for they have been in effect since 1959 and have become obsolete. The consumer's cost for insulation materials must be brought into conformity with costs; their cost should be reckoned from the coefficients of thermal conductivity, and not from consumption of materials used in their manufacture. In our opinion, this will definitely help to solve the problem.

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FUELS

COAL MINISTRY BOARD CONFERS

Moscow UGOL' in Russian No 3, Mar 80 pp 3-4

[Unattributed article: "At the Board of the USSR Ministry of the Coal Industry"]

[Text] The Board of the USSR Ministry of the Coal Industry and Presidium of the Central Committee of the Trade Union of Coal Industry Workers reviewed the performance of the branch in 1979 and the tasks proceeding from the decisions of the November (1979) CPSU Central Committee Plenum pertaining to meeting plan-specified targets in 1980.

In the first four years of the 10th Five-Year Plan our underground and strip mines produced 23.7 million tons of coal above and beyond annual targets, with 170 million rubles of above-target product sales. The first to meet the coal production target for these four years were the Gukovugol', Donetskugol', Torezantratsit, Ordzhonikidzeugol', Vostsibugol', Vakhrushevugol', Chelyabinskugol', and Estonslanets associations. These associations above-target produced 13.2 million tons of coal and 5.7 million tons of fuel shale.

At the same time the performance of certain associations, combines, enterprises and construction organizations contained deficiencies and oversights, particularly as regards putting production facilities on-line and bringing them up to full production, preparation and utilization of working face frontage, elimination of mining stoppages and equipment breakdowns, and utilization of labor, material and financial resources, as a consequence of which the branch has operated unsatisfactorily these last two years, and especially in 1979. For the USSR Ministry of the Coal Industry as a whole there has been a lag in meeting targets and socialist pledges on the major technical-economic indices -- coal production and loading, product sales, concentrate output, labor productivity, and profit. The target pertaining to number of "thousander" brigades and sections was not met.

Having examined the tasks facing this branch in 1980, the Board of the USSR Ministry of the Coal Industry and Presidium of the Central Committee of the Trade Union of Coal Industry Workers has instructed the Ukrainian SSR Ministry of the Coal Industry, executive officers of all-union and production associations, mine construction combines, underground mines, strip mines, dressing facilities and plants, construction organizations and enterprises, the Ukrainian Republic, territorial, mine, plant, construction project and local trade union committees:

1. To consider as their principal task in 1980 mobilization of all the toilers of this branch for achieving the targets specified by the plan, strengthening of plan, financial, production, labor and process discipline, strengthened monitoring and verification of achievement of plan targets, and increased responsibility of personnel for the assigned task.

2. To examine implementation of measures specified by the CPSU Central Committee and USSR Council of Ministers decree entitled "On Improving Planning and Strengthening Influence of the Economic Mechanism on Improving Production Efficiency and Work Quality" as a major economic-political task, focusing on achieving high end results.

3. To intensify organizational work pertaining to development of socialist competition for honoring in a worthy manner the 110th anniversary of the birth of V. I. Lenin and early completion of the targets for 1980 and the five-year plan as a whole. Particular attention should be focused on the performance of work forces which have pledged to complete the five-year plan by V. I. Lenin's birthday: the Donetskugol' Association, Mine Administration imeni 60th Anniversary of the Great October Socialist Revolution of the Shakhterantratsit Association, the Chervona Zirka Mine of the Torezantratsit Association, the Zyryanovskaya Mine of the Yuzhkuzbassugol' Association, the Mine imeni 50th Anniversary of the October Revolution of the Karagandaugol' Association, the Kharanorskiy strip mine of the Vostsibugol' Association, the Sukhodol'skaya Central Concentration Plant of the Voroshilovgradugleobogashcheniye Association, and "five-hundred-thousander" production sections and brigades.

4. To ensure wide dissemination of the experience and know-how of the work forces of the Mayskaya Mine of the Rostovugol' Association, the Nagornaya Mine of the Gidrougol' Association, the Mine imeni 50th Anniversary of October of the Gukovugol' Association, the Mine imeni Kostenko of the Karagandaugol' Association, and the Kharanorskiy strip mine of the Vostsibugol' Association, which completed ahead of schedule the target for the first four years of the five-year plan.

5. To draw up and implement in 1980 measures pertaining to meeting coal and fuel shale loading targets and reducing freight car idle time on the tracks of subordinate enterprises and organizations. Regularly to examine at the directors' council matters pertaining to utilization of freight cars, taking practical measures to eliminate bottlenecks in performing loading and unloading operations. To increase the personal responsibility of supervisory personnel for achieving loading targets and adhering to established standard freight car turnaround times.

6. To step up efforts in 1980 pertaining to meeting targets in the area of further retooling and renovating enterprises. To carry out an aggregate of measures pertaining to boosting labor productivity at each and every work station by means of mechanization of processes, fuller utilization of equipment capabilities, elimination of work time losses, dissemination of the experience and know-how of leading workers, observance of plan, process, and labor discipline, and strengthening of moral and material incentives to achieve increased labor efficiency.

7. To take the requisite measures to achieve in 1980 targets pertaining to savings in boiler and furnace fuel, refined petroleum products, thermal energy and electricity, as well as material-technical resources.

8. To ensure accomplishment of capital investment and construction targets. To complete in the shortest possible time elaboration of organizational-technical measures pertaining to construction and placement on-stream of facilities for producing 15.4 million tons and processing 16.3 million tons of coal. Efficiently utilizing avaialble manpower and material resources, to ensure movement on-stream on schedule of near-completion facilities. To take measures to achieve further increase in labor productivity in construction and adoption of the brigade contract. To concentrate efforts on priority construction of worker housing. For strengthening construction organizations, to take measures to bring on-stream construction industry and building materials facilities and to add to the heavy equipment fleet. To focus particular attention on construction of fuel-energy complexes.

9. For further improvement in industrial safety conditions on the job and for prevention of accidents, to effect thorough engineer refinement of production plans and schedules, development of mining operations and matters connected with meeting the requirements of safety regulations, focusing special attention on ensuring reliable and stable ventilation of cutting faces; performance of work in strict conformity with the established mining process, mine timbering and roof control procedures; allocation of sufficient time for performance of preventive measures; improvement of production discipline among mine workers and especially as regards observance of mine safety regulations and job instructions.

10. To secure in 1980 acceleration of the pace of performance of preliminary working, establishment of a stable working frontage and improvement of its utilization, sharp decrease in production losses due to mine accidents and equipment breakdowns, for which the following should be done in the first quarter of 1980: step up assistance to underground mines, strip mines and concentration plants which are not meeting targets; draw up and implement measures to speed up putting totally mechanized cutting faces into production, lending assistance to underground mines and strip mines in installing cutting face and mine transport equipment, and secure readying of coal seams at strip mines.

11. To focus particular attention on the necessity of improving the operations of mines producing coking coal, for which it is necessary to:

bring up to full strength the work force on working and development faces, and to take measures to improve operations on fully mechanized faces and to achieve strict observance of specified operating procedures;

organize preventive maintenance and repair of mine equipment in order to reduce unproductive equipment downtime;

to review on a daily basis the performance of high-output and "thousander" brigades at underground and strip mines, to provide them with material-technical resources on a priority basis, and to provide them with highly-skilled cutting face miners, mechanics and fitters;

to take measures to increase working time of development faces;

to bring the line of active working faces by the end of the quarter to 1,730 faces for the Ukrainian SSR Ministry of the Coal Industry (with a total length of 270 km), to 516 faces (44 km) for the Kuznetsk Basin, to 149 faces (18 km) for the Karagandaugol' Association, and to 58 faces (7.7 km) for the Vorkutaugol' Association;

to increase the number of totally mechanized faces in the mines of the Ukrainian SSR Ministry of Coal Industry to 600, of the Kuznetsk Basin to 199, of the Karagandaugol' Association to 120, and the number of brigades (as of 1 April 1980) working at a "thousander" pace to 120, 99, and 62 respectively;

to put in order the operating conditions of mines, sections, faces, and to improve preventive maintenance operations and equipment servicing.

12. To ensure in 1980 adherence to the schedule of bringing on-line production capacity at existing enterprises as a result of speeding up the development of production operations at underground coal mines and strip mines, providing them with an adequate work force, and eliminating bottlenecks in all production elements. To secure on this basis an increased return on fixed productive assets.

13. To take measures to ensure uninterrupted movement of run-of-mine coal to concentration plants, especially coking coal of caking grades.

14. To draw up and implement measures to improve equipment utilization, for which it is necessary:

to examine during the first quarter of 1980, for each mine and association, the reason for unsatisfactory utilization of GShO [expansion unknown], and particularly mechanized supports and continuous miners;

to establish rigorous monitoring of mechanized support setup and takedown time and major overhaul. To increase the responsibility of officials for observing equipment utilization standards.

15. To increase demandingness on supervisory and engineer-technician personnel of enterprises and associations in the matter of speeding up development and improving utilization of cutting face frontage, reducing equipment downtime and increasing machinery operating time, organization of high-productivity face-working and development brigades and creation for these brigades of requisite conditions for meeting pledges.

16. To ensure that Soyuzuglemash meets plan targets pertaining to the entire product list, focusing particular attention on production and delivery, in conformity with specified schedules, of complete sets of equipment, continuous miners, conveyers, drilling equipment, as well as spare parts for mining equipment.

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FUELS

COAL INDUSTRY SOCIALIST PLEDGES FOR 1980

Moscow UGOL' in Russian No 3, Mar 80 pp 5-6

[Unattributed article: "Socialist Pledges of Work Forces of Production Associations, Enterprises, Construction Projects and Organizations of the USSR Ministry of the Coal Industry for 1980"]

[Text] The workers, engineers, technicians and white-collar employees of the coal industry, just as the entire Soviet people, are vigorously participating in the campaign to implement the resolutions of the 25th CPSU Congress.

In the first four years of the 10th Five-Year Plan, 30.0 million tons of coal and fuel shale were produced above target, coal concentration plant workers turned out 1.7 million tons of high-quality concentrate above target, and product sales were 170 million rubles above target.

The mine construction people brought on-line new underground and strip mines with a coal and fuel shale production capacity of more than 80 million tons, and concentration plants with a capacity of processing more than 23 million tons of coal. Coal industry volume of merchantable production rose 17%.

The work forces of many mines, construction projects, plants, sections and brigades completed ahead of schedule the plan targets of the first four years of the 10th Five-Year Plan, while some completed these targets by the 62d anniversary of the Great October Revolution.

Brigades participating in the "thousanders" movement are making a large contribution to the performance of this branch; they are responsible for more than 40% of total coal production in underground mines. In 1979, for example, 449 brigades and sections reached a thousand loading, and 99 work forces produced 500,000 tons or more of coal, with seven of these exceeding 1 million. These include the brigades (sections) led by M. P. Chikh, A. Ya. Kolesnikov, and N. N. Skrypnik in the Donbass, M. N. Reshetnikov, V. G. Devyatko and G. N. Smirnov in the Kuzbass, and A. G.

Salamatin in the Karaganda Basin. Their experience and know-how at organizing competition was widely disseminated in the mines, concentration plants, in mine construction, transport, and in coal machine building.

CPSU Central Committee General Secretary Comrade Leonid Il'ich Brezhnev, Chairman of the Presidium of the USSR Supreme Soviet, noted in his message of greeting to the work force of the Mayakaya Mine of the Rostovugol' Association the considerable contribution made by the working face brigade led by Hero of Socialist Labor M. P. Chikh to the performance of the mine's entire work force and expressed confidence that the work know-how of this leading team will serve as an example for all our country's miners.

In 1980 this country's miners have a big job to do in order to provide the nation's economy with fuel, to improve planning and strengthen the influence of the economic mechanism on boosting production efficiency.

Endeavoring to respond with concrete deeds to the decisions of the November (1979) CPSU Central Committee Plenum and guided by the conclusions and points on further increasing the fuel-energy potential as specified in the address by CPSU Central Committee General Secretary Comrade Leonid Il'ich Brezhnev, Chairman of the Presidium of the USSR Supreme Soviet, at the Plenum, this country's miners are engaged in a vigorous search for reserve potential for boosting production volume.

Leading work forces of the coal basins have come out with patriotic initiatives -- to promote mass socialist competition for improving production efficiency and work quality, ahead-of-schedule completion of targets and pledges for 1980 and the five-year plan as a whole, and to honor in a worthy manner the 110th anniversary of V. I. Lenin's birth; to achieve the highest labor productivity in the traditional Lenin review month for miners' performance, held in April, and to make achieved production indices the standard in 1980, transforming it into a year of shock-work labor, work in the Leninist manner. More tha 1,300 work forces have pledged to accomplish the target of the 10th Five-Year Plan by V. I. Lenin's birthday. These include the miners of Mine Administration imeni 60th Anniversary of the Great October Socialist Revolution of the Shakhterskantratsit Association and the Chervona Zirka Mine of the Torezantratsit Association.

The work forces of the Donetskugol' Production Association, the Zyryanovskaya Mine of the Yuzhkuzbassugol' Association and the Mine imeni 50th Anniversary of the October Revolution of the Karagandaugol' Association, the Kharanorskiy strip mine of the Vostsibugol' Association, the Sukhodol'skaya Central Concentration Plant of the Voroshilovgradugleobogashcheniye Association, the Rostovshakhtostroy and Mosbassshakhtostroy combines, the Karagandashakhtoprokhodka Association of the Karagandashakhtostroy Combine, the Kopeysk Machine Building Plant imeni S. M. Kirov and the Artemovsk Pobeda Truda Machine Building Plant proposed the initiative of early completion of targets and pledges for 1980 and the 10th Five-Year Plan.

A total of 81 production sections and brigades concluded a traditional socialist competition agreement for production of 500,000 tons or more of coal (fuel shale) in 1980 from a single working face.

The leading brigades and sections of this branch came forth with an appeal to all workers, engineers and technicians in the coal industry to improve work efficiency and quality in 1980 and to work without lagging performers.

The miners gave unanimous support to the patriotic initiative of leading work forces and vigorously enlisted in nationwide socialist competition to improve work efficiency and quality, to achieve fulfillment and overfulfillment of plan targets and socialist pledges for 1980 and the five-year plan as a whole by each and every work force and by each and every worker.

The workers of the coal industry adopt the following socialist pledges for 1980:

to produce 14.8 million tons of coal and 0.9 million tons of fuel shale above target, including 6.3 and 0.3 million tons respectively by the 110th anniversary of V. I. Lenin's birth, and to produce not less than 287 million tons from fully mechanized faces;

to increase the rate of face working by 3% over the achieved rate;

to turn out 2.8 million tons of high-quality concentrate at the concentration plants above target, including 1.6 million tons for coking;

to ship out 0.5 million tons of coal above target, and saving not less than 300,000 freight car-hours in comparison with established standard figures by reducing freight car turnaround time;

to overfulfill the gross output plan per workers by 0.5%;

to produce 100 million rubles of output above target;

to increase the number of brigades (sections) producing not less than 1,000 tons per day per totally mechanized cutting face, to 506, high-productivity tunneling brigades to 544, and strip-mine excavator and transport brigades which have achieved boosted standard equipment loadings to 850;

to reduce plan-specified losses by 5 million rubles;

to save 500 million kilowatt hours of electricity, 700 tons of diesel fuel, and 500 tons of gasoline;

to improve the quality of coal shipped to the customer, reducing its ash content by 0.1% below established standard figures.

With the objective of accelerating movement on-stream of production facilities for mining and processing coal, social services facilities, and improving quality of construction:

to increase to 379 the number of brigades performing construction work totaling 500,000 rubles or more per year, including an increase to 100 of brigades performing not less than 1 million rubles of construction work, and to 600 the number of work forces working by the brigade contract method;

to ensure on-schedule movement on-stream of new underground and strip mines with a production capacity of 15.4 million tons and concentration plants with a capacity of 16.3 million tons; to complete construction on the large Zhdanovskaya-Kapital'naya Mine, with a production capacity of 2.1 million tons per year, and the Sukhodol'skaya-Vostochnaya Mine, with a production capacity of 1.5 million tons of coal per year;

to build and put into operation a total of 2,292,000 square meters of housing (1,336,000 square meters with the manpower and resources of enterprise's own construction organizations), preschool and children's facilities accommodating 5,500 children, schools accommodating 6,300 pupils, hospitals totaling 560 beds, polyclinics with a capacity of 1,800 outpatient visits, clubhouses with an accommodation of 920, and public food service enterprises with seating accommodations for 2,600 persons. Construction of housing, both privately financed and employing an organization's own resources, shall be extensively promoted in all coal basins throughout the country.

To achieve further technical retooling of coal industry enterprises, coal machine building plants pledge:

to provide mines and construction projects with mining equipment, machinery, and spare parts for them in full quantity and variety;

to turn out 1.3 million rubles worth of industrial output above target, including one mechanized package unit and three belt conveyers;

to ensure that no less than 20% of total output volume comprises products bearing the state Seal of Quality, and to secure award of the state Seal of Quality to 14 new product items;

to put into operation 190 high-productivity specialized machine tools and gang tools, and 25 new automatic and semiautomatic welding machines and machines for pressure contact welding;

to fabricate eight setup series and experimental models of basic mining equipment of 15 item designations.

Fostering and promoting the inventor and efficiency innovator movement, to obtain 160 million rubles of conditional annual savings from adoption of their proposals, including 28 million rubles as a result of adoption of inventions.

To turn over to land users 5,300 hectares of reclaimed land, to build wastewater treatment facilities with a capacity of 313,000 cubic meters per day, and to reduce by 89.6 million cubic meters the volume of polluted water discharge.

To achieve fuller satisfaction of the needs of the population, to produce 30,000 rubles of goods of cultural-services designation above target.

Continuing to implement CPSU resolutions on a further upswing in all branches of agricultural production, workers of coal industry subsidiary agriculture and sovkhozes pledged, by improving farming practices, quality of performance of agricultural work, strengthening of the feed base and boosting livestock productivity, to produce for the workers of this branch 65,000 tons of potatoes, 64,600 tons of vegetables (including 12,800 tons from glass-covered ground), 73,000 tons of milk, 13,200 tons of meat and 83.5 million eggs, and to supply 113,000 tons of feed grain for livestock.

As a result of accomplishment of the above-stated measures, substantially to improve production practices, to improve miner health protection and to provide more than 500,000 workers in this branch with trips to sanatoria, rest houses and guest houses;

to organize hot meals at work stations for no less than 500,000 mine workers;

to provide with volunteer manpower further improvement, landscaping and planting greenery in miner towns and communities.

Implementing the CPSU Central Committee decree entitled "On Further Improvement of Ideological and Political Indoctrination Work," coal industry workers will continue raising their ideological-political level, mastering economics and technical knowledge, improving their occupational skills, strengthening discipline and organization, and seeking to achieve a Communist attitude toward labor in each and every work force.

Coal industry workers, engineers, technicians and white-collar employees assure the CPSU Central Committee, Soviet Government, and personally CPSU Central Committee General Secretary Comrade Leonid Il'ich Brezhnev, Chairman of the Presidium of the USSR Supreme Soviet, that they will apply all their energies, knowledge and experience to achieve successful accomplishment of the 1980 plan and the five-year plan as a whole and will make the final year of the 10th Five-Year Plan a year of shock work.

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KANSK-ACHINSK BASIN: BEREZOVSKIY NO 1

Moscow UGOL' in Russian No 3, Mar 80 pp 14-15

[Article by Candidate of Technical Sciences V. A. Neuymin and Engineer V. S. Barashev, Giproshakht: "Firstling of KATEK -- Strip Mine Berezovskiy No 1"]

[Text] Directives of the 25th CPSU Congress specified efforts to achieve accelerated development of the coal industry in the eastern regions of this country, with emphasis on increasing strip-mine coal production. A most important role in resolving this problem is assigned to the Kansk-Achinsk Lignite Basin. Gently-dipping coal seams up to 90 meters thick are bedded here at a depth of 10-250 meters. This basin is to be the foundation for establishment of the Kansk-Achinsk Fuel-Energy Complex (KATEK), which will include large coal strip mines and thermal electric power stations. Establishment of this fuel-energy base will ensure balanced development of the Central Krasnoyarsk Complex with priority development of energy-intensive industries, and will also serve as a raw materials base for producing processed solid fuel, synthetic liquid fuel, gas and chemicals. In addition to meeting Siberia's energy needs, there will be a realistic possibility of transmitting by overland power transmission lines a portion of the energy resources in the form of electric power to the Urals and European part of our country, and to supply them with high-calory fuel.

Establishment of the Kansk-Achinsk Fuel-Energy Complex is to be carried out in several stages. At the first stage plans call for completing renovation of the Irsha-Borodinskiy No 1 strip mine and to open up a second strip mine, Irsha-Borodinskiy No 2, to complete renovation of the Nazarovskiy strip mine in the western part of the basin, and to establish two new strip mines -- Berezovskiy No 1 and Uryupskiy No 1 (first unit). The total projected output of these strip mines will be 160 million tons of coal per year. At the second stage plans call for continued development of the Uryupskiy No 1 strip mine and construction of the Itatskiy No 2, Berezovskiy No 2, and Itatskiy No 1 strip mines. Thus after completion of the second stage of development of KATEK, the total projected production capacity of this basin's strip mines will comprise approximately 350 million tons per year.

In order to support construction and normal operation of KATEK industrial enterprises, number of common regional facilities are to be built: jointly with the USSR Ministry of Power and Electrification, a construction base, plants for repair and overhaul of equipment, transportation facilities, communications facilities, regional water supply system, etc. The new town of Sharypovo is to be built for construction workers, erectors, installers and fitters, power engineers, power industry workers, and coal miners.

Twenty design, scientific research and academic institutes took part in the feasibility study and preliminary design of the Berezovskiy No 1 Mine, which will be KATEK's first new coal-mining enterprise. Technical solutions pertaining to moving the coal were adopted on the basis of a specially-conducted group of geological prospecting, scientific research and experimental projects performed by a large group of institutes in cooperation with mining equipment manufacturers. The first unit of this mine is to have a production capacity of 27.5 million tons, while its full output capacity will be 55 million tons of coal per year. The coal from this mine will be consumed by the in-construction Berezovskaya GRES-1, thermal electric power stations and central heating plants of Siberia's enterprises and cities.

This mine is located in a geologically thoroughly-explored area situated in the southwestern part of the Berezovskaya coal field and boasts the most favorable geologic conditions for mining coal. The mine's total designated area runs 8.5 km along the strike, and 5.5-7.8 km along the dip. Within these boundaries the average coal seam thickness is 55 meters, and the seam is gently dipping. Coal reserves within the designated mine boundaries total 3.8 billion tons, sufficient for approximately 70 years of mining operations. Overburden thickness, according to coal seam outcrops under detritus at the southern end, ranges from 7 to 28 meters, reaching 225 meters at the end of the working area. The stripping factor ranges from 0.4 to 3.5 m^3/t, averaging 1.7 m^3/t.

The coal seam's bedding conditions and the dimensions of the strip mine designated area predetermined that stripping operations be set up on the basis of a central access trench and two dividing trenches, working the mine area in two sections -- western and eastern. The western section, containing the most favorable geologic-mining conditions, will be developed first. The eastern section -- the second unit of this mine -- will go into operation 3 years after startup of the western section. Volume of major stripping work, which will be performed by ESh-15/90 dragline excavators, will total 40 million cubic meters.

A transport-spoil bank system has been adopted for removing overburden in the section of the first unit, with employment of 5250 m^3/h rotary excavators and equal-output spoilbank spreaders, with a 190 meter spreading boom overhang. The ERP-5250 multipurpose rotary excavator will be built, based on the already-existing ERShRD-5250 rotary excavator, for operation in the harsh climatic conditions of Siberia. The ERP-5250 will have shortened operating parameters and increased cutting effort (1.4 MPa). This excavator is capable of operating at temperatures ranging from +35 to -40°C and with blasted large inclusions with piece size up to 500-600 mm in the overburden.

Rotary excavators with an output of 5250 m^3/h have also been adopted for coal excavation, with the coal loaded on conveyers, which transport it to collection bunkers located in the mine's central facilities area. From the collecting bunkers the coal will be transported to:

up to 25 million tons a year to GRES-1 by two conveyer lines -- one a regular operating line, and the other a standby line -- each with a carrying capacity of 4000 tons per hour, with a beltwidth of 1600 mm and speed of 4.5 meters per second, with the coal conveyed 14.7 km;

to the loading stations at Ugol'naya yard, for loading into rail consists, at a volume of up to 30 million tons per year, with subsequent transfer to the MPS Dubinino yard by a 9.5 km branch line.

Maintenance and storage facilities are provided at the mine for servicing and minor repairs on mining and transport equipment, as well as for receiving, storage and release of all types of materials and equipment requisite for maintenance and repairs: a cluster of maintenance shops, a truck-bulldozer yard, equipment and supply storage facilities, refined petroleum products storage, plus other buildings and structures.

The mine will be supplied with 220 kV power from the to-be-built Sharypovskaya 220/110/10 kV substation.

Indices	Berezovskiy No 1 Mine		Bogatyr' Mine
	First Unit	Full Development	
Designed output, million tons	27.5	55.0	50.0
Labor productivity per worker, tons per month	2276	2740	1650
Prime cost of producing 1 ton of coal, rubles	1.04	0.92	0.88
Specific capital investment in mine construction proper (reduced to comparable conditions), rubles per ton	-	5.93	5.86
Profitability*	27.5	40.6	21.9

* For Berezovskiy No 1 Mine, with coal per-ton price 4.69 rubles according to KATEK technical-economic report; for Bogatyr' Mine -- 2.12 rubles according to current price list

An experimental plant will be built at the mine to produce liquid fuel from Kansk-Achinsk coal. Processing of 22,100 tons of coal and 6,000 tons of crude oil per year at this plant will produce 2,800 tons of gasoline, 4,000 tons of diesel fuel and 6,300 tons of boiler fuel. Mine construction will involve building two units, with designation of completion-targeted facilities in each, in conformity with movement on-stream of the rotary mining excavators. During construction of the first unit, taking account of facilities of the preparation period and common regional designation, 25 million cubic meters of mine development excavation will be performed, 70 km of rail lines will be built, as well as 70 km of roads, and 125 km of high-voltage powerlines. Four big ERP-5250 rotary excavators and two ORSh-190 spoilbank spreaders will be assembled, and approximately 40 kilometers of conveyer lines will be laid out. The first production setup will have a capacity of 13 million tons.

The mine layout and estimate specifies establishment of a construction base as a component of the unified KATEK production base: a production-process setup management base with an annual schedule of 50 million rubles; a mechanization base with 300 units of construction equipment; a 450-vehicle truck facility; a reinforced concrete products plant with an output capacity of 30,000 cubic meters, with production of 125,000 cubic meters of commercial concrete and mortar per year; a subcontractor organization base with an annual schedule of 2 million rubles; a woodworking plant producing 70,000 square meters of carpentry items, with a sawmill with a production capacity of 58,000 cubic meters of commercial lumber.

Excellent technical-economic indices should be obtained as a result of implementation of the technical solutions adopted in the project plan, after the mine comes on-stream. For purposes of comparison, the attached table contains figures for the Bogatyr' Mine in the Ekibastuz Basin.

In addition, the labor productivity indices adopted in the project design of the Berezovskiy No 1 Mine are six times greater than the average figures achieved at USSR coal industry strip mine operations, while the cost indices are less than half the average figures.

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VASILIY IVANOVICH SOLOD OBITUARY

Moscow UGOL' in Russian No 3, Mar 80 page 63

[Unattributed obituary: "Vasiliy Ivanovich Solod"]

[Text] On 10 January 1980 Doctor of Technical Sciences Vasiliy Ivanovich Solod, chairman of the Department of Mining Machinery and Equipment at the Moscow Mining Institute, a prominent scientist in the field of mining, member of the CPSU, and veteran of the Great Patriotic War, died suddenly in his 58th year.

V. I. Solod was born on 4 February 1922 in the village of Trubaytsy, Poltavskaya Oblast, in a peasant family. He graduated from the Lisichansk Mining Secondary Technical School in 1941 and went to work at a mine in the Donbass.

At the very beginning of the Great Patriotic War V. I. Solod joined the CPSU, fought to the very last day of the war, and received the Order of the Red Star plus other decorations.

In 1946 Vasiliy Ivanovich enrolled at the Moscow Mining Institute, from which he graduated with distinction in 1951 as a mining engineer, specializing in mechanical engineering. V. I. Solod devoted all his knowledge and energy to the task of training engineer and scientist personnel for the mining industry and the development of new mining equipment. He enjoyed great and deserved respect among his faculty colleagues and the institute's Komsomol and party organizations. V. I. Solod served as Komsomol committee secretary, secretary of the institute party committee, and member of the Oktyabr'skiy Rayon Committee of the CPSU.

V. I. Solod successfully combined considerable work in civic affairs with his teaching and research work. He served in 1960-1962 as institute pro-vice-chancellor for scientific activities, and in 1969, following successful defense of his doctoral dissertation, he was named chairman of the department of mining machinery and equipment.

V. I. Solod directly participated in drafting and examination of plans for developing and putting into production advanced mining equipment. He founded and headed a new area of scientific endeavor dealing with a most important problem of mining machine building -- development of equipment for mining coal without the constant presence of people at the working face.

Vasiliy Ivanovich devoted much energy and knowledge to the training of highly-skilled mining engineer-machine builders. Curricula in the area of mining-mechanical engineering were developed and improved under his guidance. He is the author of a number of college-level textbooks and manuals. V. I. Solod published more than 150 scholarly and methods papers on current problems of mining machine building and mining training. A total of 48 candidates and six doctors of technical sciences were produced under his tutelage.

V. I. Solod served as deputy chairman of the Expert Council of the USSR Ministry of Higher and Secondary Specialized Education, served as member of the technical councils of the USSR Ministry of the Coal Industry, Giprouglemash, the Mining Institute imeni A. A. Skochinskiy, and the scientific councils of a number of areas of specialization at mining higher educational institutions.

V. I. Solod was awarded the Badge of Honor, the For Labor Valor Medal and the Miner Glory Badge, 2d and 3d Class, for his outstanding labor achievements.

High demandingness on himself, integrity and party principledness, the finest qualities of a scientist, educator and indoctrinator earned Vasiliy Ivanovich great prestige and respect from his fellow faculty members and students, the community at large, miners and mining machine builders.

A warm memory of Vasiliy Ivanovich Solod, a loyal son of the Communist Party and the Soviet people, will remain forever in the hearts of his students, companions-in-arms and comrades.

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ADVICE GIVEN ON CORRELATING PRODUCTIVE OILFIELD FORMATIONS

Moscow NEFTEGAZOVAYA GEOLOGIYA I GEOFIZIKA in Russian No 1, Jan 80 pp 3-6

[Article by E. M. Khalimov and M. M. Ivanova (of Ministry of Petroleum Industry and Moscow Institute of Petrochemical and Gas Industry imeni Academik I. M. Gubkin): "Detailed Correlation of Productive Formations and Their Significance in the Development of Oil and Gas Fields"]

[Text] Decisions of the 25th CPSU Congress and of last year's CPSU Central Committee aimed oil and gas industry workers at a sharp rise in effectiveness in developing oil and gas fields and at a truly economical attitude toward the use of our country's national riches--oil and gas resources.

The complexity of this most important problem keeps on growing because of the arrival of the petroleum industry at the mature phase of its development.

A rise in the share of formations with complicated physical geology features in new oil and gas fields is characteristic of the modern period.

Simultaneously with this, many fields previously introduced into development have arrived or are arriving at the extremely complicated late stage, when careful geological substantiation and scientifically competent management of all development processes are required for the successful withdrawal of the reserves being tapped.

Under these circumstances, questions of detailed oilfield-geology study of the structure of the productive portion of the field's profile become even more important.

Primarily it is necessary to raise the accuracy of calculations of oil and gas reserves and to differentiate reserves by zones of strata with various degrees of productivity. Correctness in calculating reserves is basic to achieving planned withdrawal. It should be noted that achievement of the planned withdrawal has proved to be in doubt for some fields by virtue of an overstated evaluation of the economically feasible reserves. One of the causes of this has been that reserves were often computed in accordance with a formation of productive rocks as a whole and not separately for the strata that made up the member. Such an approach is especially typical for calculations of reserves in carbonaceous sediments.

In order to resolve all questions about developing operating formations, it is necessary to study thoroughly the geological inhomogeneity of the productive strata. In monitoring the development of oilfields, a study of the degree of coverage of the beds by the development process, the paths for movement of the driving agent in the strata, and the distribution of the remaining oil reserves in the strata at each new stage of development of the formation becomes of paramount importance.

The oil industry's orientation to the wide use in coming years of new stimulation methods has been promoted by still another task of oilfield geology--that of obtaining the necessary data and evaluating it on the basis of the effectiveness of the new stimulation processes for the various physical-geology characteristics of the formations. Because of this, the role of oilfield geology is growing rapidly as a science on the basis of which integrated studies of holes by geological and geophysical methods are being performed. The role of specialists in the area of oilfield geology also is growing.

It must be noted that the quality and scale of study of drilled holes lag behind the modern requirements of science and practice. The vigorous development of oilfield-geology research in the first two decades after start of the wide introduction of waterflooding has been replaced in recent years by a remarkable lull. As a result, the pace of growth in scale of oilfield-geology research has lagged behind the industry's requirements. The amount of work done on questions of the integrated generalization of primary oilfield-geology information is inadequate. Few conferences are being held on generalization of achievements in the area of procedures for oil-geology research in various parts of the country.

Because of this, organizational measures for strengthening all elements of oilfield-geology services that are now being taken by the Ministry of Petroleum Industry must be reinforced by measures aimed at raising the level of work on procedures.

One of the measures should be conferences of specialists on various aspects of detailed oilfield-geology, which should be held periodically and at which appropriate recommendations on procedures should be developed.

Above all it is necessary to generalize and analyze modern notions about the methods for the detailed correlation of the productive beds, since this is the basis for all geological constructions that throw light on the structure of oil and gas deposits.

In examining methods for detailed correlation, first its place among other methods for studying the geological structure of productive beds should be determined.

As is known, geology uses several types of correlation for geological profiles, which are applied at various stages in the study of sedimentary complexes. On the whole they solve a single problem--establishment of the mutal correspondence and relationships of the various parts of the geological cross-section within the region being studied.

At the same time, each type of correlation uses its own research methods, assumes its own scale of research, and solves different tasks.

With the great diversity of the terminology used in this matter, it is possible to single out three basic types of correlation--regional, general and detailed.

Regional (or interregional) correlation is performed when studying large regions (provinces and oil or gas bearing regions) by using paleontological, petrographic, geochemical, geophysical and other types of data obtained during study of the logs of existing holes and of rock outcroppings on the earth's surface. Its purpose is to construct the general scheme of sequence of stratification of the sedimentary rocks and their three-dimensional interrelationships within the region studied.

General correlation, which is sometimes called correlation at the exploratory phase, or full correlation, local correlation, and so on, is carried out for the purpose of studying the geological structure of the entire cross-section of a specific oilfield while it is being explored.

One of the chief tasks of general correlation is isolation of the productive complexes in the oilfield's cross-section and study of their interrelationships with the overlying and underlying parts of the cross-section.

Detailed correlation is usually understood to mean correlation of the productive part of the field's cross-section in order to study the nature of the distribution by area of each of the productive beds and intercalated beds and also of the impermeable interfaces between them. Various researchers call this type of correlation detailed or intercalation correlation, or interval-by-interval or strata-by-strata correlation, and so on. In our opinion the first term is more felicitous.

Proceeding from the volume and nature of the primary data and also the named, "detailed correlation," two main stages should be singled out within it.

The first stage is detailed correlation upon the completion of exploration of the field, which is carried out by means of oilfield geophysical data, data from a study of exploratory-hole cores, and the results of hole testing.

During this stage, a detailed correlation is made for the whole productive part of the cross-section with a view to solving tasks of calculating oil reserves and making up the first design document for development. The results of the first stage of detailed correlation are used to substantiate the singling out of formations for calculating oil reserves, a breakdown of the productive cross-sections into recovery targets, and a quantitative evaluation of the reserves.

Taking the results of the detailed correlation into consideration, the spacing of the main body of developmental and injection wells is planned in the first design document for development. A qualitative evaluation of the geological heterogeneity of the productive beds, which is carried out on the basis of the detailed correlation, predetermines the forecasted final withdrawal of crude oil.

The second stage of the detailed correlation is carried out for the operational formation chosen, upon completion of the drilling and mastery of the main body of producing and injection wells that the first draft document calls for.

At this stage the vast volume of information that is obtained during both the drilling of a large number of holes (oilfield geophysical research data) and the recovery process (data about the mutual interactions of the holes and the strata, the photocolorimetric nature of the crude, the nature of water encroachment of the holes, and so on) is used. An analysis of these data (taking strata perforation intervals into consideration) permits the correlation scheme to be made more precise and the communicability or discontinuity of the strata between the wells to be judged.

The mission of the second stage of detailed correlation is a careful determination of the geological inhomogeneity of the operating formation, which is necessary for making up the second design document for development, and also for geological substantiation of the sequence of realization of measures for controlling the development process, for the purpose of drawing the formation's production volume into active operation to the maximum possible extent.

And so, based upon the detailed correlation, additional production and injection wells are sited, the pace of withdrawal of liquid from the formation's various strata is substantiated, and questions of perforating the strata at additional wells, cutting off water-encroached stata and wells and so on are solved.

The detailed correlation is carried out following the general correlation, that is, where the basic marker horizons (reference points) have already been found and identified in the cross-section of the field's rocks.

Difficulty in the detailed correlation usually consists in the fact that the main reference points are absent directly within the productive part of the cross-section and, even more so, within the production formation Cases where the reference points are traced close to the cross-section interval being studied and conform to the rocks that underly or overly its members should be considered to be more favorable.

More often there is only one conformably occurring reference point--above the productive part of the cross-section or below it. In more complicated cases the reference point closest to the part of the cross-section being studied is observed in a rock member that occurs unconformably in relation to it.

Difficulties of detailed correlation increase especially where there is substantial variability in thickness of the reservoir strata and of the impermeable layers that separate them, where there is a washout within the formation, where there is a sharp facial-lithological variation of the rocks, and where reservoir strata have discontinuous structure over the area of their distribution, and impermeable divisions are inserted between them at some sections along the strike of the reservoir rocks.

In each oil-producing region oilfield geologists often use their own methods for detailed correlation, which are based to a great extent upon great professional experience and scientific intuition. However, in the works that interpret the correlation constructions obtained, these methods, unfortunately, are not described in adequate detail. Usually the authors limit themselves to information about available reference points without naming the methods used to correlate the strata between the reference marks.

At the same time, some recommendations can be made for correlating productive strata:

during detailed correlation, as with other types of correlation, rely upon stratigraphic principles, that is, the principles of the stratification of sediments;

for detailed correlation, use the logs of those oilfield geophysical methods that provide for a more precise breakdown of the cross-section and the potential for singling out characteristic sections of curves on them;

carry out the correlation by taking into account existing notions about the prerequisites for formation of the sediments being examined that predetermine the rhythmicity of the sedimentation and consistency of change in the nature of deposition of the various rocks by area and by thickness;

as a criterion of identicality of strata, use the similarity of mapping of analogous strata on the logs;

begin the correlation by choosing the logs that are more typical for the part of the cross-section that is being examined, and then compare logs of the remaining wells with them;

where several representative types of logs are available, make the correlation within them and then correlate them with each other;

use additional marker strata that are singled out in the cross-sections only of individual holes but that help to carry out a more reliable correlation;

where the thickness of the cross-section interval being correlated is constant, take into account the approximate equal distance of the analogous layers both from the upper and from the lower edges of the interval;

where there is a substantial change in thickness of the part of the cross-section being correlated, find the cause of this change on the basis of a comparison of the cumulative statistical cross-sections that are made up for sections of a field with varying thickness (the method suggested by I. P. Cholovskiy);

where a uniform reduction in the thickness of all thr strata is discovered, check the correctness of the correlation, using the principle of proportionality of the thickness;

when preparing a detailed correlation, use all possible data of the microscopic study of the core and also data about the interactions of the holes and of the strata obtained during development on the basis of observations of the effect of the injection of water or other agent, or during the conduct of special studies at the oilfield; and

as a line of reference for the correlation scheme, use the reference point that directly expresses the nature of deposition of the productive strata, or, only when there is none--the closest marker stratum that overlies or underlies the rock members that lie unconformably (preferably the first of these). Where there are nonconforming rocks within the productive thickness, the reference points of the productive part of the cross-section that are situated both above the zone of unconformity and below it can be used as lines of reference.

The rules named are common for all regions studied. At the same time, each region, based upon studies performed, must formulate additional methods for detailed correlation for specific geological conditions and define rational complexes of oilfield-geophysics research and other studies that will provide for the use of these methods.

It is obvious that the methods for detailed correlation of terrigenous strata in regions where they have been formed in unstable shallow-water basins will differ from the methods used in regions with deltoid waterway formations or in regions where saline tectonics have exerted an influence on the formation of the beds and structures.

Methods of detailed correlation of carbonaceous sediments for which the use of microscopic core study data are more necessary than for terrigenous sediments require special attention.

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OIL HARDER TO FIND NOW, DEEPER STUDIES NEEDED

Moscow NEFTEGAZOVAYA GEOLOGIYA I GEOFIZIKA in Russian No 1, Jan 80 pp 12-15

[Article by A. G. Aleksin, N. A. Krylov and V. F. Mazanov (Moscow Institute for the Petrochemical and Gas Industry imeni I. M. Gubkin): "Urgent Problems of Raising the Effectiveness of Geological Exploration Operations for Oil and Gas"]

[Text] Acceleration of the development of the USSR's oil industry and of its economics depends to a great extent upon the correspondence between the industry's production level and raw-material reserves, so the timely augmentation of reserves by the discovery of new oilfields is of decisive importance. This situation becomes especially severe in the modern era of development of the industry, with its large scale of crude-oil recovery and intensive pace of expansion of reproduction. The main growth in reserves at present and in the long term is related to the further conduct of prospecting and exploration in the so-called old oil-producing regions, which are marked by the greatest activeness of the reserves, and also to the development of new regions that promise to be oilbearing, including the shelves of the adjacent seas. At the same time, prospecting for new fields and deposits is marked by ever-increasing difficulties. The most important of them that complicate the conduct of geological exploration and directly affect its effectiveness include:

the ever-increasing extent to which most regions of the Urals-Volga, the Caucasus, Central Asia and the Ukraine have been explored, and the resulting smaller probability of the discovery of large oilfields;

the entry of exploratory operations into regions that are more complicated in their geology and natural and climatic conditions and into regions that are poorly developed or not developed at all, and also onto the continental shelves;

the involvement in exploration of formations at lower structural levels, which were deposited at substantial depths and are marked by complexity in the drilling of holes; and the ever-increasing amounts of prospecting for oil deposits that are affected by zones of regional lensing out and stratigraphic unconformity.

In the long term, conditions for prospecting and exploration will become increasingly complicated.

Providing for high effectiveness of geological exploration under the new conditions will depend upon the accelerated development of petroleum-geology science and most rapid improvement of methods and equipment for various types of prospecting and exploration operations.

An analysis of the modern state of petroleum-geology science points to the need to concentrate scientific efforts and material resources on accomplishing tasks that will help to raise radically the effectiveness of geological exploration in coming years, mainly on intensifying study of the processes of the formation and the laws governing the location of oil and gas fields, which will provide for development of the science--the geology of oil and gas--and for scientific and technical progress in the industry. For the fact is that, in order to discover new fields in minimum time and at least expense, it is necessary, above all, to discover the laws that govern their spatial positioning, that is, to determine the direction of prospecting operations.

Theoretical research must be focused on integrated substantiation of the tectonic, lithologico-stratigraphic, geochemical and hydrogeological laws that govern the spatial positioning of oil and gas fields and also on the differentiated identification of zones of maximal concentration of hydrocarbon resources in the earth's crust. Reliable forecasting of the phase state and composition of the fluids and of the zonal distribution of the types of reservoirs and of hydrocarbons in the various lithologico-stratigraphic complexes should be provided for.

There are important problems that have been poorly developed theoretically, and the research results available about them still do not, at this stage, exert due influence on raising prospecting and exploration effectiveness. One of these problems is the presence of oil and gas in deep zones of the earth's crust. The experience of recent years indicates that we are not prepared from either the technical or the theoretical standpoints to solve these problems.

In order to continue to prospect successfully for oil and gas deposits at great depths (in areas of Ciscaucasia, the Caspian Sea depression, Central Asia, the north of West Siberia and elsewhere, further improvement of existing methods and the creation of new methods for studying the geological structural plan of deeply buried beds is required: a study of change of reservoir rocks and of the screening effect of the rocks with depth; and the creation of methods for scientific forecasting of the phase state of hydrocarbons in deposits at great depths, as well as of theoretical bases for the occurrence and forecasting of AVPD [anomalously high formation pressure].

The integrated study of various oil and gas bearing provinces is an urgent necessity. Such oil-producing regions as the Volga-Urals district should, during the Eleventh Five-Year Plan and in the long term, retain their significance among the country's main oil-producing regions. Support of a consistently high level of recovery here depends primarily upon the preparation of new oil reserves at the requisite formations. This, in turn, requires the solution of a number of scientific and practical problems.

One of these is development of the substantial potential resources associated with carbonaceous series of strata of the Upper Devonian and the Lower Carboniferous in the territories of Tataria, Bashkiria, Udmurtia, the West Urals and elsewhere.

In the theoretical (scientific prospecting) plan, this task requires deep study of the structural geology and the facial lithology features of the carbonaceous complexes, the nature of the distribution of reservoirs and traps of various types in them, the morphogenetic types of the traps and the laws governing their location, the characteristics of the migration and accumulation of the fluids, and, finally, the distribution (as a function of a set of these factors) of the oil and gas deposits.

It should be noted that certain border regions of the Volga-Urals province have not yet been adequately studied, or have, in general, been poorly studied (Udmurtia, the Permian district, and the Timan-Pechora province).

Because of this, the results of studies in well-drilled adjacent regions and consistency in the location of the oil and gas deposits discovered there are of great interest, especially from the point of view of forecasting the types of oil and gas bearing formations (traps, reservoirs and rocks) and of the main trends (consistencies) in their spatial arrangement.

In the lands of young platforms, especially within the Central Asian and Ciscaucasian plates, the main questions to be solved include: the geological structure of the formational make-up of pre-Jurassic sediments of the Siberian, Central Asian and Ciscaucasian platforms; the organic matter and the stages of its transformation in the pre-Jurassic sediments of the young platforms; the physical characteristics of the Paleozoic (pre-Jurassic) rocks and the spatial consistency of change thereof; and the prerequisites for the formation of and the consistency of location of zones of oil and gas accumulation.

A major self-contained problem for the West-Siberian plate is study of the industrial oil-bearing capacity of the fractured bituminous argillites of the Bachenovskiy suite. A number of purely theoretical questions of great practical significance remain to be solved. These include: clarification of the characteristics of the rocks' mineral content, the genesis of the capacitative and filtration characteristics of these rocks, the origin of platiness and fracturing, which create conditions for accumulation of the oil, the genesis of the oil, characteristics of the formation of deposits that contain absolutely no water, causes of the appearance of AVPD, and many other questions. Moreover, it is necessary to give an objective evaluation of the potential possibilities of the Bazhenovskiy suite.

The problem of developing a set of geologico-chemical criteria for qualitative and quantitative forecasting of the presence of oil and gas underground at various stages of the prospecting and exploration process is extremely urgent now.

Key problems of the theory of the formation of oil and gas deposits include questions about the time of the formation of the deposits and the cyclicity (the periodicity and the orientation) of the forming of the oil and gas, which are needed in special research based upon regional data. The question of the simultaneity or absence thereof in the forming of deposits within large oil and gas bearing complexes, zones, regions and provinces is of great theoretical and practical interest.

Later, studies on development of the theoretical foundations for the forming of hydrocarbon accumulations will require experimental work in the modeling of a mechanism for the formation of deposits.

A knowledge of the laws of the formation and spatial distribution of hydrocarbon accumulations in the earth's crust will allow:

a sounder quantitative assessment to be made of the prospects that large regions and territories of the USSR as a whole harbor oil and gas;

forecasts of new regions to be made and optimal areas for prospecting and exploration to be defined; and

rational distribution of the volume of prospecting and exploratory work and of deep drilling at the more promising areas and stratigraphic complexes to be planned.

All this taken together will provide for the compilation at a high scientific level of the integrated designs that are at present the basis for planning and executing prospecting and exploratory work in the industry.

The indicated designs will provide for a maximum growth of reserves, since they will consider not only the features of the geological structure and the prospects for the presence of oil and gas in a region but also the economic factor and the provisioning of supplies and equipment when choosing and defining specific targets for prospecting and exploratory drilling. The planning and execution of geological exploration based upon integrated designs is a new and progressive method with which opportunities for raising exploration effectiveness are associated.

It is known that one of the main factors that leads in some cases to great delay in discovering new deposits and to excessive outlays is imperfection of the procedures for geologico-geophysical operations and of sets of them. It is necessary, therefore, to develop theoretically substantiated new methods and procedures for prospection and exploration for crude-oil and gas-condensate fields and to improve the existing ones, taking into consideration the differences in geological conditions, that is, to solve problems of prospecting methodology. While in many cases the stratigraphic target for prospecting is adequately substantiated geologically and the region of operations is known, the absence of rational procedure here is the main factor in low effectiveness of geological exploration. In this connection, the main efforts should be focused on the problems, among which the most urgent are:

the most rapid development of new methods for prospecting for oil and gas fields, mainly of remote methods (the use of aerial and space photography data in prospecting) and of direct geochemical and geophysical methods;

improvement of the whole complex of existing geological, geophysical and chemical methods for the purpose of prospecting for oil and gas deposits in lithologico-stratigraphic type traps throughout a whole profile and for anticlinal traps in the lower structural levels; and

improvement of the methodology for the preliminary and industrial exploration of oil and gas fields under various geological conditions.

In relying upon domestic and foreign data for remote methods, one may speak with confidence about their high promise. Aerial and space information provides, where conditions are favorable, for selection of the more promising areas for geological exploration and the rational distribution of amounts of geophysical operations and of key holes and appraisal holes. The most graphic positive results were obtained by the Ministry of Petroleum in areas of the Pripyatskaya and Dneprovsko-Donetskaya depressions. However, the slow pace of development of this work must be noted.

The urgency of the most rapid development of a methodology for prospecting for oil and gas deposits in lithologico-stratigraphic type traps should be especially emphasized, since the main reserves for increasing and maintaining the achieved level of recovery in regions of developed recovery are associated with prospecting for new fields and deposits in these complicated conditions.

In describing the modern state of methodology for prospecting for nonanticlinal traps, it should be noted that, despite the existence of certain successes on the part of both geological methods and, especially, of geophysical methods, the term "difficult to discern" is correctly reserved for traps of this type.

With a view to accelerating the solution of this task, Ministry of Petroleum Industry scientific-research organizations, jointly with production organizations and geophysical trusts, are now organzing testing sites, mainly in the most promising regions, in order to perform there in concentrated fashion procedural-test operations that should provide in the next few years for the development of a rational methodology for prospecting for oil and gas deposits in traps of the lithologico-stratigraphic type.

In order to raise the effectiveness of geophysical operations it is necessary mainly to create the equipment and to develop a methodology for seismic surveying for prospecting and for preparation of structures in subsalt and subtrap sedimentary complexes and at great depths.

It has now become necessary to create geophysical facilities that will support the collection and initial processing of the whole complex of geologico-geophysical information about the profiles of holes being drilled.

This article does not cover urgent problems connected with improving equipment and technology for drilling work and with testing exploratory holes under complicated geological conditions.

However, it is possible to point to the strict necessity to provide geological exploration organizations with:

floating drill rigs for offshore drilling at depths of 200 meters or more;

technical means for discovering and for penetrating strata with high and anomalously high pressures;

drilling equipment and technology for drilling at depths of up to 7,000-8,000 meters;

more improved procedures for discovering and testing productive strata where depths are great and the reservoir structure is complicated; and

more improved structural articles for testing beds during drilling, and so on.

Thus, a further rise in effectiveness of the complex of geological exploration operations for oil and gas depends greatly upon a concentration of fundamental and applied research into the most important scientific and technical problems, high quality solutions for them, and accelerated introduction of the results into the practice of prospecting and exploration for new oil and gas fields.

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BETTER DELINEATION OF STAGES, PHASES OF OIL SEARCH PLANNING OFFERED

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[Article by A. A. Aksenov, A. G. Aleksin, O. K. Glotov, L. P. Klimushina, V. T. Khromov, A. N. Shardanov and A. S. Fokin (of Ministry of Petroleum Industry and Institute for Geology and the Development of Mineral Fuels): "Phasing Geological Exploration for Oil"]

[Text] The principle statute about the stages and phases of geological exploration operations [12] was first worked out in 1963 and was further developed in 1969. Its implementation has raised considerably the effectiveness and quality of prospecting and exploration work in our country and it has also helped in the detailed analysis and evaluation of their efficacy at all phases of the search process.

The existing statute divides the geological search process into two stages--prospecting and exploration. The first is subdivided into three phases: 1) regional geologico-geophysical operations; 2) the preparation of areas for prospecting drilling; and 3) prospecting for fields (or deposits) of oil and an evaluation of reserves under the C_1 and C_2 categories. The exploration stage is not broken down into phases but is completed by the preparation of fields for development and a calculation of reserves under categories $B+C_1$. The role of the prospecting process was greatly reinforced by the 1969 statute. It reflected objectively the existing trend in the development of methods and equipment for prospecting, since improvement of the traditional geologico-geophysical methods, the development of new, especially aerial and space methods, and an increase in drilling depth will enable a number of tasks to be solved earlier during the prospecting and exploratory phases, their overall duration to be reduced and their effectiveness to be raised.

However, the statute now in effect needs improvement. In particular, it is necessary to integrate three phases into the first search stage and to delineate the prospecting and exploration stages with precision. According to the statute, the task of the prospecting stage is not only to discover fields (or deposits), as was the case in the 1963 guidance, but also to evaluate the industrial significance of the field and substantiate reserves under categories C_1 and C_2. At the same time, obtaining reliable data for calculating C_1 category reserves in accordance with the current "Classification of Reserves of Fields of Oil and Fuel Gases" [11] requires the drilling of a certain number of additional holes after the first discovery hole. The desirability of additional hole-drilling after discovery of the deposit and prior to its industrial exploration is obvious from prevailing operating practice [4] and provokes no doubts, but the number thereof was not defined more exactly by the 1969 statute. This has occasioned indeterminacy of the boundary between the prospecting and exploration stages, which adversely affects development of an optimal system for prospecting holes (more precisely, prospecting test holes) and determination of the amount of drilling for completion of the prospecting stage and directly for exploration of the deposits discovered.

Since 1975 the USSR Ministry of Geology system has placed a restriction on the number of prospecting wells (up to 3). But this measure does not correspond with the 1969 statute, since three holes are in the overwhelming majority of cases capable only of solving the problem of discovering the field.

It is the authors' opinion that improving the phasing of the prospecting and exploration process should consist not in a radical change of the 1969 scheme and not in a return to the old scheme, as proposed by certain geologists [1 and 5]. It should follow the path of closer correlation with the growing potential of geological, geophysical and other methods and with the new potential for integrating them, and also the path of a general rise in requirements for quality of the work done.

A refined scheme for phasing the process of the geological search for oil, in which the work of each phase is assigned definite tasks, the main types and methods of study are enumerated, the missions of the targets are indicated, and the results of the work, with an evaluation of the reserves of various categories, are given, is shown in the table.

The following is new in the proposed scheme. In the last 15 years the pace of development of oil and gas territories has increased greatly, and the role of quantitative prognostic evaluations of the prospects for the presence of oil and gas as the bases for optimal development of prospecting and exploration in oil and gas bearing basins has grown. This requires a rise in the volume of regional operations and an increase in the depths of coverage and precision thereof. The development of geophysical methods, especially of remote methods that use aerial and space information, has increased the geological information content severalfold, and the wide integration of various methods and procedures has been predetermined. At present, during regional geophysical studies and all types of remote studies highly mobile and precise methods are used that allow large areas to be mapped with standardized quality on scales of 1:1,000,000, 1:500,000 and 1:200,000, which, as a rule, are adequate not only for obtaining three-dimensional representations of an oil and gas bearing basin as a whole but also for discovering zones of oil and gas accumulation and for establishing the types of local prospecting targets.

Scheme for Phasing the Process of Prospecting and Exploring for Oil

Stages	Phases	Targets of operations	Tasks of the operations	Types and methods of the operations	Results of the studies
Regional-reconnaissance	1. Regional	Oil and gas bearing basins and provinces	Mapping of main elements of geological structure; lithologico-stratigraphic study of sedimentary cover; general evaluation of prospects for presence of oil and gas	Aerial, space, geologico-geophysical surveys on scale of 1:500,000 or finer. Key-hole and appraisal-hole drilling	Maps and schemes of tectonic regionalization and geologico-geophysical profile. A 3-dimensional model of the oil and gas bearing basin. Breakdown of the sedimentary cover into structural formation complexes, singling out the main promising parts of the cross-section; oil-geology regionalization with forecast evaluation under categories D_1 and D_2
	2. Reconnaissance	Oil and gas bearing districts, regions and zones	Finding and mapping possible zones of oil and gas accumulation of structural and lithologico-stratigraphic types; lithologico-stratigraphic, geochemical breakdown and correlation of logs and study of reservoirs	Aerial, space and geologico-geophysical surveys on scales of 1:200,000 and 1:100,000; hydrogeological and geochemical studies. Appraisal and structural drilling	Maps of structure, thickness of possible zones of oil and gas accumulation and regional zones of lithologico-stratigraphic traps; geologico-geophysical profiles; a 3-dimensional model of the oil and gas accumulation zone, facial, hydrogeological, geochemical schemes of promising complexes; schemes of prospects for presence of oil and gas and forecast evaluation under categories D_1 and D_2. Plans and integrated designs for prospecting and exploring to discover and evaluate industrial quantities of oil and gas
Prospecting	3. Preparation of areas for prospecting drilling	Zones and local oil and gas traps of structural and lithologico-stratigraphic types	Preparation of local structural and nonanticlinal traps for prospecting drilling	Detailed aerial, space and geologico-geophysical surveys on scale of 1:500,000 and larger; integration of direct methods for prospecting for hydrocarbon accumulations. Core and profile drilling	Shape, area and amplitude (volume) of a local trap. Structural maps, geologico-geophysical profiles of the trap, diagrams of thickness of main horizontal reservoirs; evaluation of prospects for presence of oil and gas under category D_0. Evaluation for presence of oil and gas in the trap by the method of isocontacts, analogy and so on. Design for prospecting drilling
	4. Prospecting for oil and gas deposits	Prepared oil and gas traps of various types	Prospecting for oil and gas traps and study of the lithology and hydrogeological and geochemical properties thereof	Prospecting drilling for local traps combined with detailed seismic exploration	General evaluation for presence of oil and gas by cross-section, singling out main targets of exploration, compilation of preliminary 3-dimensional model of a discovered field (or deposit) with evaluation of reserves under categories C_2-C_1.
	5. Geologico-economic evaluation of industrial value of oil and gas deposits discovered (preliminary)	Discovered hydrocarbon deposits	Preliminary evaluation of the industrial scale of discovered oil and gas deposits	Prospecting-test drilling; testing of all deposits found; taking of soil and fluid samples; oilfield geophysical research	Preliminary industrial evaluation of oil and gas reserves under categories C_1 (50-60%) and C_2, detailed 3-dimensional model of the field (or deposit); design for exploration and industrial-test operation
Exploration	6. Exploration of oil and gas deposits*	Industrial oil and gas deposits	Preparation of industrial hydrocarbon deposits for development; computation of reserve by industrial category	Exploratory drilling; oilfield geophysical study; detailed seismic exploration; analysis of aerial & space data (including magnetometric, geothermal, and so on)	Creation of detailed 3-dimensional model of the field, with evaluation of all deposits, horizons, reservoirs and traps, physical and chemical properties of the hydrocarbons, and calculation of industrial reserves under category B (20-30%) and under category C_1 (70-80%)
	7. Industrial test operation of oil and gas deposits*	Industrial oil and gas fields	Study of regimes of operation of industrial hydrocarbon accumulations; development of method and system for operating the field; refinement of industrial oil and gas reserves	Industrial test operation of the field; drilling of appraisal and step-out holes	Evaluation of regimes for working the operational formation, development of system and method for operation, refinement of industrial reserves under category B (up to 70-80%); a reliable 3-dimensional model of the field (or deposit); compilation of a scheme for developing the field

*Phases 6 and 7 can be combined for small oil deposits and for simply structured gas deposits.

However, in prospecting and exploration practice, often there are cases where regional studies are curtailed after discovery of the first fields in some portion of a promising region and later they have to be renewed. This leads to a reduction in the effectiveness of the entire geological search process as a whole, primarily because of the selection of nonoptimal directions for prospecting with reference both to the main, promising stratigraphic targets and to the tectonic elements.

Thus, for example, in East Siberia the characteristics of the regional structure of promising horizons still has not been discovered, plans for key-hole and appraisal-hole drilling are not carried out, and, at the same time, large amounts of exploratory drilling have been expended in the Markova field region and at various Nepa arch structures. This has hindered evaluation of the prospects for the presence of oil and gas and the development of prospecting work in the Tunguska, Sayano-Yenisey and Nepa-Botuobinskaya syneclines, at the East Yenisey fault bench, and in other promising regions of Siberia.

Existing experience testifies to the need to single out the regional reconnaissance stage as an independent one, which can be subdivided into phases: the regional phase (scales of 1:1,000,000 to 1:500,000) and the reconnaissance phase (scales of 1:200,000 to 1:100,000). The regional phase is aimed at a study of the general features of the geological structure of the sedimentary basins, their tectonic regionalization, and a comparative evaluation of the prospects for the presence of oil and gas in a basin as a whole or in large parts of it. Tasks of the reconnaissance phase are the discovery and mapping of potential zones in which oil and gas may have accumulated, singling out top-priority regions for the organization of detailed operations, and determining the main types of local prospecting targets. Singling out this phase of regional operations as an independent one is being proposed for the first time. In geophysical operations practice, which does the main amount of regional research, reconnaissance-type photography has long occupied a completely definite place in the prospecting process [6]. It is conducted for the purpose of prospecting and structural mapping of tectonic elements of the second order and discovering zones of regional lensing-out and stratigraphic truncation, and, therefore, completely justifiably can be included in the stage of the geologico-geophysical studies being examined as an independent phase. The regional-studies stage should be completed by a quantitative evaluation of the forecast of the presence of oil and gas.

The prospecting stage should be commenced only after solution of the tasks of the regional-reconnaissance stage, to include a set of geologico-geophysical operations that will provide for the qualitative preparation of traps for prospecting drilling, and it is concluded with the discovery of fields and an evaluation of their reserves.

It is proposed that the stage being examined be divided into three phases: preparation of areas for prospecting drilling, prospecting for oil fields and oil deposits, and an evaluation of the industrial scale of a discovered field (or deposit). Consequently, the third phase is singled out for comparison with the existing scheme.

At present, the phase of the preparation of areas for prospecting drilling is completed by an evaluation of reserves under category C_2. In most cases reserves of this category are determined during the study of new formations by means of the geological analogue method, which is not noted for great precision, and, in essence, borders on a prognostic assessment, although, unlike forecast reserves, it is is calculated not for the territory but for each local target, taking its geological structure into consideration. Therefore, it is proposed that the reserves of new structures that have been prepared but not drilled over be included in the prognostic assessment and singled out as subgroup D_0. Such proposals already have appeared in the periodical literature, experience indicating that an assessment of reserves for traps that are not studied by drilling often is not fully confirmed later and the reserves are written off.

The tasks of the second phase of the prospecting stage are: to prospect for deposits at the maximum possible depth accessible by the drilling of holes, and to evaluate the reserves under categories C_1 and C_2. At this phase promising targets are sampled and a preliminary three-dimensional model of the discovered field is made up.

The prospecting phase of the proposed scheme is directly confined to discovery of the deposit, and the next operations are broken down into the self-contained phase of a geologico-economic assessment of the industrial significance of the field (a preliminary evaluation). These are the operations that complete the prospecting stage.*

In the third phase of the prospecting stage, an evaluation of the industrial value of the discovered deposits is made, and a design for exploration and industrial-test operation is compiled.

The establishment of a boundary between the third appraisal-prospecting phase of the prospecting stage and the exploratory stage presents a definite difficulty, since it depends upon an expert evaluation of the nature of the accumulation of hydrocarbons. Refinement of this boundary should follow the line of a more precise evaluation of the field's (or deposit's) industrial value. In the opinion of S. P. Maksimov and others [9], for an evaluation of the industrial significance of a discovered field, a validation of at least 30 percent of its reserves under category C_1 should be considered optimum. In order to accelerate preparation of the industrial reserve and more reliable validation of the amounts of the reserves and of the methods for their industrial exploration, it is desirable to bring the evaluation of reserves under category C_1 up to 50-60 percent. This can be done by drilling an optimal number of prospecting-appraisal holes, combined with seismic exploration worked out in detail, and by oilfield-geophysics methods for determining the deposit's boundaries (seismic, gravity, magnetic and electrical logging).

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*Eight-five percent of all fields are discovered during drilling of the first three holes.

An optimal system for spacing prospecting-appraisal holes for the main types of deposits can be developed and regulated only within the rigid bounds of definite phases, with the introduction of seismic exploration, worked out in detail, into the mandatory complex of operations right after drilling of the first discovery well, regardless of the dimensions or type of trap. The effectiveness of using seismic exploration worked out in detail has been proved by prospecting and exploration practice in, for example, the Timan-Pechora [3 and 8] and West Siberian [2 and 7] oil and gas bearing basins.

Thus, singling out the prospecting appraisal phase fulfills the principle of accelerating geological searching and makes possible the rational conduct of operations of the next (explorational) stage and the complete omission of it for most small fields. In this case, the phase being singled out differs greatly from the preliminary exploratory phase, a return to which is proposed by some researchers because it does not require a cumbersome system of planning and confirmation of the sequence for doing the work at the prospecting area, and it promotes maximum mobility and acceleration of the prospecting and exploration work as a whole, that is, a rise in their geologico-economic effectiveness.

It is desirable to divide the exploratory stage of operation into two phases: 1) industrial exploration, and 2) industrial-test operation [10 and 14]--that is, to practically legitimize existing operating practice. The first phase corresponds to the 1969 statute, the second reflects existing operating practice, with the use of anticipatory operational drilling. The operating task for the second phase is to obtain dynamic parameters of the deposit and refine its drive both by industrial-test operation and by hydrodynamic methods.

It should be noted in conclusion that under the proposed scheme for phasing the prospecting and exploratory process, all phases are subordinated to one purpose--to obtaining a three-dimensional notion about the geological bodies being studied. Because of this, the final operating results for each phase should be defined in accordance with the scheme not only by means of the appropriate categories of reserves but also by means of the standard targets for development. For regional operations, these are three-dimensional models of the oil and gas bearing sedimentary basins or parts thereof and of zones of oil and gas accumulation; for the phase of preparation of formations for prospecting drilling--the various shapes of the traps; and for prospecting and exploration--three-dimensional models of the fields and deposits (preliminary for prospecting, and detailed for industrial exploration).

In order to raise the effectiveness of discoveries, the design for prospecting should be made up on the basis of two mandatory documents--maps of the upper and lower surfaces of the deposit proposed. The first document is obtained on the basis of seismic cartographic (or drilling) operations within the local area that is being prepared for prospecting drilling, the second on the basis of the construction of maps of isocontacts [13] within the zone of oil and gas accumulation or of maps (or diagrams) of the degree to which the trap is filled.

It should be emphasized that the creation of each new document involves change in some of the statutes associated with it. Therefore, the development of the new scheme for phasing brings up the necessity for reworking the appropriate related documents.

The main features of the scheme for phasing prospecting exploration that is being proposed are:

1. Breakdown of the prospecting and exploration process into a larger number of stages (3) and phases (7), which is caused by the complexity of the tasks of prospecting for and exploring hydrocarbon deposits at great depths and in complicated traps of various types and by the development of new methods for finding promising formations.

2. The division of regional operations into an independent stage which calls for the mandatory use and integration of rational, economically effective methods (aerial, space, aeromagnetic, geothermal, geochemical and other surveys) that will permit the structure of oil and gas bearing districts as a whole to be mapped, possible zones of oil and gas accumulation to be singled out and local targets for prospecting to be noted. This increases considerably the effectiveness of the traditional methods for studying regional structure and for discovering and preparing traps for prospecting drilling.

3. More precise regulation of targets, tasks and types and methods of operation and of research results for each phase. The scheme also calls for combining separate phases for small or simple hydrocarbon deposit structures.

Each phase is completed by an evaluation or by the preparation of hydrocarbon reserves: the regional phases by a quantitative evaluation of the forecast of the presence of oil and gas (under the D_1 and D_2 subgroups); the phase of preparation of the area by a forecast evaluation under the D_0 subgroup; the phase of prospecting for deposits by a preliminary evaluation of the industrial reserves not below category C_1 (20-30 percent) and promising reserves under category C_2 (70-80 percent); the phase of evaluation of the industrial value of deposits by a computation of the reserves under Category C_1 (50-60 percent) and C_2 (40-50 percent); and the phase of exploration for deposits by a computation of reserves under categories B (20-30 percent) and C_1 (70-80 percent).

The question of industrial-test operation with a view to determining the recovery potential of fields and to obtaining primary data for a compilation of industrial schemes for developing them deserves a separate examination.

The exploratory stage should be considered as completed when the oil reserves adopted in the state inventory under category B that are being transferred for oilfield development consist of not less than 70-80 percent.

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FUELS

BETTER QUALITY MINING EQUIPMENT CALLED FOR

Moscow TRUD in Russian 31 Jan 80 p 2

[Article by Hero of Socialist Labor V. Devyatko, honored miner of the RSFSR V. Kolokol'nikov, and P. Frolov, brigade leaders of complex mechanization clearance brigades at the "Raspadskaya" Mine of the "Yuzhkuzbasugol'" Production Association, located at Mezhdurechensk in the Kuzbass: "Where Is the New Ore-Mining Equipment? The Question Awaits Resolution."]

[Text] The technical revolution which has taken place in the coal industry over the past 60 years provided us miners with domestically-made ore-mining equipment which is not at all bad. Mechanized complexes of the MK, OKP and KM types have enabled many brigades to raise their average daily loadings at the mine head to 1,000 and more tons. Dozens of collectives are bringing up to the surface every year 500,000-700,000 tons of coal each, with some of them producing 1 million or more tons.

What could be better, it would seem! All the more since the majority of the remaining brigades must only grow to the level of the front-runners. This is the problem: these days, the efforts of many work collectives which mine 1,000 or more tons per day boils down to hanging on to the level which they have achieved. There are many reasons for this. We would like to discuss one of the reasons in greater detail.

As we work our ready reserves we are forced to proceed deeper and deeper into the bowels of the earth in pursuit of coal and to gather it from under mine shaft roofs with ever-greater pressures upon them. These rocky monoliths rest "on the shoulders" of mechanized complexes, deforming them and putting them out of order. The further down these working levels go, the higher the pressure upon them, pressures not foreseen in planning the mechanisms of today.

Thus, at level number nine of our mine in 1975, we were forced twice to halt work in the shaft, equipped with the 1-MKM complex, and to do some major strengthening of the aggregate under factory conditions. The mine shaft stood idle 81 days and over 80,000 tons of coal was lost. Last year, the mine shaft being worked by the brigade led by V. Kolokol'kov was so disrupted as to convert the modern OKP-70 complex into a slow-moving "invalid."

We emphasize this fact: the OKP-70 deserves to be considered today as the best not only in its own line but even among the remaining mechanisms of its type now in series production. However, even it is only capable of operating under moderate pressure conditions. At the "Raspadskaya" Mine, however, as well as at a number of other mines in areas such as ours, the capability of the OKP-70 for mining coal today is almost completely exhausted. In order to work mine shafts under new conditions it is necessary to switch over to equipment of higher quality, to a new generation of complexes, complexes which are more stable, easier to manage and capable of higher productivity.

Such equipment has been developed by designers. For example, the KM-130, the UKP and the KMT complexes are capable of withstanding mine pressures of up to 100-120 tons per square meter, pressures which are two to three times higher than that of aggregates now in series production. These new mine reinforcement units have proven themselves in excellent manner upon being tested under production conditions, reducing the mine accident rate to a minimum. As a consequence, our average daily producivity has doubled and almost tripled. On the sixth mine-working level, the brigade led by B. Kulikov was able to mine 860 tons per day in 1978 with the aid of the OKP-70 complex; in 1979, with a KM-130 unit (this under even more difficult mining-geological conditions), the brigade was able to produce 2,200 tons of coal. Using a KM-81 complex on its seventh mining level, P. Frolov's brigade extracted 947 ton per day in 1976; in 1977, their production rose to 1,817 tons a day with the aid of the KM-130; last year, their production was up to 2,723 tons per day, thanks to the 2-UKP complex. Under very difficult mining-geological conditions, this collective of miners has set as its goal for 1980 the extraction of 1 million tons of coal per day through use of the 2-UKP complex.

The most important achievement of these new reinforcement devices is that they enable us to completely clear out the coal in heavy coal-bearing strata. Not one of the complexes which are currently in series production possesses such capability, inasmuch as the extractive capability of each of them is 60 to 70 centimeters less than the thickness of the strata. As a result, an entire layer is left behind in the shaft. Is that a businesslike way of doing thing?

The superiority of these new types of equipment is self-evident. This is precisely the equipment we have been dreaming of. The USSR Ministry of the Coal Industry agrees with us. Plans call for the "Raspadskaya" Mine--one of the largest producers in our nation--to shift over in the future to three complexes--the UKP, the KMT and the KM-130. Other mining collectives are also awaiting the same equipment. Well...a snail moves along at its own pace--the equipment will show up sometime. The USSR Ministry of the Coal

Industry has begun, it is true, manufacture of the KM-130 with an extractive capability of 3.5 meters; however, production of one with a higher capability of up to 4.5 meters is being delayed, as before. As for the UKP and KMT complexes, no plans are being made (as far as we know) for their being put into production.

The choice of coal-mining combines for use along with these mine-shaft reinforcement units, is a matter which is also going poorly. Existing combines (the KSH-3M is the best one) absolutely do not satisfy us. They are unreliable in operation and are technologically imperfect: the chain drive is so positioned as to be dangerous and so as to make it impossible to use the combine against the entire mine head; the transmission is also poor, etc. There is a ray of hope here, however. Thus, in conjunction with the 2-UPK giant complex, the brigade led by P. Frolov successfully tested the KSH-75 coal-mining combine--with no chain drive, mounted on cog wheels, and with a coverage span of 4.2 meters on a verticle patch of coal--which embraced the strata fully. Right now, this machinery is undergoing some small design adjustments but it is absolutely clear that it is this model which should be "pushed" as quickly as possible into series production without wasting further precious time on office debate.

What is delaying the output of new and well-proven equipment? They say that it is the lack of production capacity at plants plus the increased amount of metal required by the new models. But one would think that the production capacity could be derived by removing patently outmoded equipment from series production. In addition, more energetic efforts should be made (this is not the first time such a statement has been made) towards expanding the machine building base for our coal miners. Simultaneously, considering the ever-increasing need for coal and the difficulties connected with its extraction, a joint effort should be made by the USSR Gosplan and the USSR Ministry of the Coal Industry to seek out the opportunity for having part of this production of heavy coal-mining complexes done at plants under the USSR Ministry of Heavy and Transport Machine Building: the plants there have had experience in the production of reliable equipment for the coal industry. Some thought should be devoted, along with this, to how best to restore order to the production of spare parts for this new equipment.

As regards the additional expenditure of metal, there are two answers to this question. First, these mine-reinforcement complexes should be made out of more durable steel, which will decrease metal expenditure during their manufacture and during subsequent repairs to the aggregates. Secondly, one of these heavy type complexes will produce as much coal as is now being extracted by two to three of the machines which are in series production today. Consequently, these new models will be, in fact, much more economical than those presently produced, if one considers the proporiton of metal expended to ton of coal extracted.

...The years go by and our miners go down ever deeper into the bowels of the earth. A new generation of complexes and combines should become their faithful assistants--this is inevitable. But the path from prototype of this equipment to initiation of its series production is a very long one.

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FUELS

GAS CONDENSATE; REFINING SHOULD BE IMPROVED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Feb 80 p 2

[Article by B. Pichugin, head of a sector of the Krasnoyarskiy Kraykom Industrial Department: "Promises Only"]

[Text] The Noril'sk industrial area is expanding at a stormy pace over the course of the 10th Five-Year Plan. The area has now become one of the largest consumers of imported petroleum products in the nation's eastern region. Yet navigation on the Yenisey River averages only 100 days a year and the oil tanker fleet is in no condition to fully satisfy the volume of liquid fuel required by this tremendous industrial area. Also, transport costs on the river are not cheap--it costs 25 rubles more to deliver a ton of petroleum products to Dudinka than it does to ship a ton of it to Krasnoyarsk.

A fundamental resolution to this problem would be to provide industrial Taymyr with liquid fuel through the organization of its production locally. Such a prospect is a realistic one. In every cubic meter of natural gas extracted from the Soleninskiy Field near Noril'sk there are over 13 grams of gas condensate out of which after a relatively uncomplicated reprocessing, it is possible to derive high-octane gas and diesel fuel.

Local reprocessing of this gas condensate would enable us to put an end to the hauling of 50,000 tons of petroleum products from Krasnoyarsk every year and to save 1.25 million rubles a year on transport expenditures. It goes without saying that the gasoline and diesel fuel thus freed would be an appreciable addition to the energy potential of the nation's eastern regions. Meanwhile, the gas workers of Taymyr are forced to erect storage facilities out in the permafrost for this condensate and even to pump it back into wells.

Why is not a rational use being made of this wealth from out of the bowels of the earth in Taymyr? The story of this dates back about 10 years.

According to the technical design for construction work at the Yuzhno Soleninskiy gas condensate deposit, a design developed in 1972 by the Saratov All-Union Scientific Research Institute of Gas Extraction, plans call for construction of a complex structure for the reprocessing of gas condensate. With achievement of its planned capacity, this plant was to produce tens of thousands of tons of gasoline and diesel fuel each year.

But the pity of it all is that the USSR Ministry for Construction of Petroleum and Gas Industry Enterprises has been unable, over the course of a number of years, to organize the erection of this installation. Following an appeal made to the ministry by the Krasnoyarskiy Kraykom, Minister B. Shcherbina issued an order in September of 1977 which designated the "Mosgazprovodstroy" Trust and Construction-Installation Administration number three as general contractor for the structure. The date for placing the installation into operation was set as the fourth quarter of 1978. Kray organizations provided the construction project with all of the necessary aid: the provision of design and cost estimate documentation, equipment, and financing. The people for whom the plant was being built--the "Noril'skgazprom" Association--trained personnel for the operation of the installation. However, today this construction project is far from being completed because its builders are working very poorly.

Over these years, many executives of the "Mosgazprovodstroy" Trust and of the main administration for construction of pipelines in Siberia were frequent visitors to Noril'sk and Dudinka. Questions involving placement of the installation into operation as quickly as possible were reviewed on the spot by USSR Deputy Minister S. Arakel'yan. Yet everyone acknowledges the fact that matters at the installation are proceeding unsatisfactorily.

There is a lack of qualified personnel, equipment and material resources. It all boils down to this: if the necessary aid is furnished, it would be possible to complete the construction work and to place the installation into operation over the course of the next 3 to 4 months. We feel that the leaders of the USSR Ministry for Construction of Petroleum and Gas Industry Enterprises must put an end to this story which has dragged on for so long.

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FUELS

NEW, MORE EFFICIENT PUMPS DEVELOPED

Baku VYSHKA in Russian 6 Jan 80 p 2

[Article by K. Manafov: "A Guarantee of Precise Work"]

[Text] The work collective of the Machinebuilding Plant imeni Dzerzhinskiy has embarked upon the series production of pumps without bushings. By their design and technological manufacture they are substantially different from the pumps which are now being produced. Depending upon its size, assembly of every old pump required from 7 to 17 pieces of machined steel bushings. In these new pumps, the bushings have been replaced by entire cylinders, which reduces a great deal the expenditure of metal and the cycle for machining them on metal-cutting lathes.

Design of these pumps without bushings was worked out by specialists of the "Neftemash" special design bureau while plans for its technical manufacture were worked out by associates of VNIIPTNEFTEMASH [All-Union Scientific Research Institute of Petroleum Machine-Building].

"These pumps are the first of their type to be produced in the nation," plant director Mekhti Seidovich Akhadov tells us. "Four thousand of these pumps without bushings have already been manufactured. They are now undergoing industrial tests at the following oil-gas extraction administations: 'Leninneft'', 'Kirovneft', the Administration imeni 26 Baku Commissars, and 'Artemneftegaz.' Responses from petroleum workers have been positive and the pumps are operating faultlessly and reliably."

As it was explained to us by specialists, introduction of these new pumps is of great economic benefit both to petroleum industry workers and to our machinebuilders. In using pumps with bushings, it is possible for oil to leak through the assembled bushings and for the plungers to break down prematurely. And, finally, the precision built into certain sizes of pumps is often thrown off in the course of their being transpored. All of this has a negative effect on the process of petroleum extraction where the usual oil well pumps are used.

All this will not happen when those oil wells use pumps without bushings. Machinebuilders will also stand to gain by this. For manufacture of the bushings alone dozens of turning and honing lathes are required. The labor capacity of these lathes is high but the metal utilization coefficient of the bushings is low. With the transition to the new pumps, there will be a great reduction in the number of metal-cutting lathes which will be required and, as a result of this, fewer lathe operators. Efficiency of metal usage will be increased one and one-half times.

The first steps have already been taken. Going on at the plant now is the retooling needed for a full transition within the next few years to the manufacture of pumps without bushings. The production of 20,000 new pumps is planned for this new year of 1980. For this purpose, individual shops and sections of the plant are being supplied with up-to-date equipment as reconstruction of these shops and sections is being completed.

We have been kept appraised of the work which has been done. An unusual and long (about 6 meters in length) special automatic turning lathe is installed in one corner of the bushings shop. The lathe was created in accordance with technical assignments set by the specialists of the All-Union Scientific Research Institute of Petroleum Machine Building at one of the nation's machine tool building plants. Lathe Operator A. Mirzoyev is putting the finishing touches on a cylinder which is over 4 meters in length. In the course of his shift, he will have "turned" (this is what the process is called) 20 such cylinders. To strengthen the internal surfaces of those cylinders, special shop furnaces are used to place a coating of nitrogen on them. For this purpose, three tunnel furnaces have been installed in the plant's former assembly shop. Two similar furnaces are being installed adjacent to them, these with a greater capacity.

Following the nitrogen coating process, the cylinders move on to the turning lathe shop with its extra long lathes for a final processing--honing with diamond abrasives. Lathe operators Nikolay, Akhmerov and Surven Agadzhanyan use whetstones to polish the internal surfaces until they sparkle like mirrors. For the time being, this process is done on two universal turning lathes which have been modernized for this work. Soon, however, our machine builders will receive a special semiautomatic lathe.

Going on at other lathes is the processing of other important components--the plungers. Following this, their surfaces are covered with chrome. This makes it possible to do a good job in fighting corrosion during the pump operation process.

All of these machined parts and components then move on to the assembly shop for final assembly. This work is entrusted to the leader of the plant's chief design department group, Aleksandr Kurilenko. Fitters Nikolay Nikitin and Vadim Voroshilov assemble these pumps without bushings in a matter of minutes, while tester Zeynal Safarov checks them with the aid of a hydraulic press. This is a guarantee of their faultless operation. In the initial days of this new work year, the brigade will assemble up to 80 pumps. Their output will increase over the period which will follow.

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FUELS

DOLZHANSKAYA-KAPITAL'NAYA MINE DEVELOPMENT

Kiev PRAVDA UKRAINY in Russian 27 Feb 80 p 2

/Article by A. Zharkikh (Voroshilovgradskaya Oblast): "Will There Be a Mine of the Future?"/

/Text/ The idea was quite original--not only to build a new mine, but also to develop the most improved mining equipment for it. Everything--from the coal digging complex to the washing of the miners' boots.

The staff members of the Institute of Mining imeni A. A. Skochinskiy by means of calculations convincingly demonstrated that only under such conditions is it possible to obtain the maximum yield from the capital investments in the development of the sector. And the collective of the Khar'kov Yuzhgiproshakht /State Institute for the Planning of Mines in the Southern Regions of the USSR/ confirmed: this matter is quite realistic and promises great benefits. The Khar'kovites drafted an engineering plan, which was soon agreed on and approved in many state instances.

Thus the new Dolzhanskaya-Kapital'naya mine construction project emerged not far from Sverdlovsk in Voroshilovgradskaya Oblast. And they began to call it the mine of the future. Because in the sector there is not yet a coal enterprise of such a great capacity. According to the plans of the designers, it should yield from the four highly mechanized faces about 14,000 tons of coal a day.

In order to guarantee such production, it is necessary to have unconventional equipment. In all 55 scientific research, planning and design and design institutes, plants and production associations took part in its development. Moreover, nine ministries and departments of the country were equipped. A large amount of work on the designing and production of tens of types of new equipment both for the mine itself and for the grouped concentration factory had to be performed. A special honor fell to the collectives of Ukrainian institutes and machine building plants. Dongiprouglemash, for example, was in charge of the development of the design of the AK automated coal digging complex, coupling timbers, the Soyuz-19 cutting system and other machinery and equipment.

Nine years have passed since the first stake was driven at the new mine construction project. But barely more than half of the capital investments have been assimilated. The plan on construction and installation has been fulfilled by only 65 percent. Of the 43 km of underground drifts 28 km have been driven. Today not a single project in practice is ready to be turned over.

What are the reasons? One of them is that the Voroshilovgradshakhtostroy Combine is not allocating the necessary manpower. But the main one is that there is no technological equipment. Of the 32 types of new machines and equipment only 13 have been accepted by enterprises for series production. Among the equipment being produced there is, unfortunately, no basic equipment--coal digging and cutting units, machinery of the skip winding and car hoisting, a face conveyor and vehicles.

The first model of the AK system--the creation of 17 institutes, design bureaus, associations, including Dongiprouglemash, and plants: the Donetsk Experimental Machine Building Plant, the Khar'kov Svet shakhtera Machine Building Plant, the Gorlovka Machine Building Plant imeni S. M. Kirov, the Dnepropetrovsk Plant of Automatic Mine Equipment, the Voroshilovgrad Uglemekhanizatsiya Association--was built two years ago.

A very high degree of automation of the system was planned: almost without the assistance of people it should cut the coal, load it, deliver it to the reloader, timber the face and manage the hanging wall. In it there are devices which can easily remove the arches of permanent timber work of the passages and replace the hands of miners in many other operations. A dream of miners!

But they have not yet been able to embody the dream in life, although at the Mayak Mine, which is adjacent to the Dolzhanskaya-Kapital'naya, they have even specially organized an experimental section for the testing of new equipment.

When designing the section, the workers of Yuzhgiproshakht tried as if to carry over the conditions from the future mine to the operating face. And in May 1978 two of the new combines bit into the thick seam for the first time. Despite the difficulty, the miners successfully assimilated both the machines and the unconventional coal mining system. But, nevertheless, the system, as they say, did not work. The maximum workload did not rise above 1,110 tons of coal a day--many miscalculations of the designers showed. As a result the decision was made to dismantle the combines and turn them over to their creators. Thus, nearly 10 million rubles, which had been spent on the system and exercises with it in the experimental section, went down the drain.

Of course, you will not manage without material outlays in such an important matter as the building of a mine of the future. For in solving creative problems you would not say: it is yours for the asking. But the cited fact nevertheless suggests sad thoughts. In the nine years (a considerable time!), during which the Dolzhanskaya-Kapital'naya has been under construction, practically no new scientific and engineering decisions on the re-equipment of the coal industry have appeared, although specific problems were outlined, great creative forces were recruited and considerable capital was allocated. And a good idea on the creation of a unique experimental base for the sector, a model of coal enterprises in essence was up in the air.

I had occasion to be present during the conversion of Deputy Technical Director of the Sverdlovantratsit Association A. I. Petrenko with B. P. Merkulov, representative of the Kiev UkrNIIproyekt /Ukrainian State Scientific Research and Planning Institute of Coal, Ore, Petroleum and Gas Industries/, who was completely bewildered--he did not know what to do with the device for washing the miners' boots. And the following curious incident happened with this unit. In the middle of last summer G. Yu. Dzyuba, director of a group of UkrNIIproyekt, came to the Mayak Mine. He spotted an appropriate place for the unit, reckoned the dimensions of the room with an experienced eye and, having signed an agreement on the performance of tests, left.

And two months later the "boot washer" was delivered. But here is the misfortune: the room proved to be too small. No matter how B. P. Merkulov tried to squeeze the unit in there, nothing came of this. So up to this day the washer is lying in the mine yard. Perhaps, it was not worth telling about this in detail. But when you become more closely acquainted with the story of the development of some type of equipment or other, you often encounter similar moments: here they did not carry out the calculations completely, there they overlooked something. Dongiprouglemash drafted the technical specifications for the Soyuz-19 cutting system six years ago. Only after three years was a prototype produced, after two more years industrial tests were held at the Mine imeni A. G. Stakhanov of the Krasnoarmeyskugol' Association. In the end it turned out that the Soyuz-19 fell short of the expectations and was declared unsuitable for operation at the Dolzhanskaya-Kapital'naya.

Such a fate also befell many other machines and devices, the deadline for the placement of the giant mine into operation was upset. Moreover, in connection with the lag of construction a portion of the reserves of the main seam were turned over to the operating Mayak and Odesskaya mines, the deposits of coal in the western block decreased appreciably. Now the question of expediting the preparation of the eastern block has become urgent.

In September of last year the Collegium of the Ukrainian SSR Ministry of the Coal Industry adopted a decree, in which there is the following paragraph: "Ask the Ukrainian SSR Ministry of the Coal Industry to oblige planning and design institutes to expedite the work on developing breakage face and cutting equipment, which ensures high technical indicators, and to commission the Institute of Mining imeni A. A. Skochinskiy, Yuzhgiproshakht and Dongiproshakht to draw up proposals on the use at the Dolzhanskaya-Kapital'naya Mine series-produced (now operating--author) equipment for preliminary operations and the extraction of minerals." In this connection

Yuzhgiproshakht was ordered to adjust the plan, having made provision for the change in the systems of the preparation of the breakage sections, auxiliary transport and ventilation. In order words, to begin everything from scratch.

Consequently, the executives of the Ukrainian Ministry of the Coal Industry acknowledged their powerlessness to influence in any way the course of construction and to provide it with the specified technological equipment. Thus, it is doubtful that the Dolzhanskaya-Kapital'naya will become a model mine of the future. Hence, it is not ruled out that it will turn into an ordinary coal enterprise.

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CSO: 1822

FUELS

BLOCK CONSTRUCTION OF SIBERIAN PETROLEUM, GAS FACILITIES

Moscow IZVESTIYA in Russian 21 Mar 80 p 2

/Article by R. Polyanskiy, chief of a department of the Main Administration of State Experts of the State Committee for Construction Affairs: "The Construction Site Has Become an Assembly Shop"/

/Text/ Nature located a considerable portion of the petroleum and gas reserves available in the country in the north, far from industrial enterprises and major cities. The specific local conditions--the severe climate, the flooding of the area, soft ground, swamps, the lack of roads, the inhabitability of the region--create additional difficulties for using the raw material resources of Siberia. It is well known that the construction cost of industrial and civil projects under the conditions of Western Siberia as compared with the European part of the Soviet Union increases more than twofold.

In this connection the problem of building petroleum- and gas-producing facilities and production structures for the transportation of petroleum and gas with the minimum recruitment of manpower at the construction site is of great national economic importance.

The complete block construction method, which has been developed the most in Western Siberia, became the solution of this problem. Its essence is that many field facilities are completely fabricated at rear bases and in plant shops, and then are delivered in blocks to the site, over any distance, and are erected there. This method makes it possible in the development of Siberian deposits to increase labor productivity fourfold.

The complete block method of construction was developed scientifically and substantiated theoretically at the All-Union Scientific Research Institute of Main Pipeline Construction, with the participation of which the experimental construction and development of the first pumping stations of block design were carried out.

The start of industrial adoption of the method dates from 1967, when complete block units, which were manufactured in Tyumen' (by Construction

Administration No 19 of the Main Administration for Construction of Petroleum and Gas Industry Enterprises in Tyumenskaya Oblast), were shipped on barges and set up: in Nefteyugansk--the first complete block cluster pumping station for the injection of water into the bed; in Surgut--a boiler house for two boilers and a diesel electric power station for two units.

Subsequently the scale of the complete block method of construction was expanded, and the obtained data confirmed the correctness of the construction method, which was adopted for Western Siberia, since they made it possible to reduce labor inputs to one-fourth to one-third and to decrease to the same extent the duration of the work at the construction sites.

Here at the same time as the development of the technology of building according to the complete block method a check of the constructed facilities during their operation was made, the possibility of their independent operation and the remote monitoring and control of the units was verified, accessories, tools and new methods of performing preventive repair were developed.

At this stage the questions of the delivery of blocks to the construction site by rail, water, air and other types of transport, as well as of the year-round performance of construction and installation work were resolved.

A harmonious scientific-designing-production system, which was subordinate to this method and to which a number of organizations of the Ministry of Construction of Petroleum and Gas Industry Enterprises belonged, was set up for the development of complete block construction in Western Siberia.

The implementation of the comprehensive goal program made it possible in a short time (in the past three to four years) to develop more than 200 plans of individual structures and special-purpose industrial complexes of complete block design.

Petroleum pumping stations of various productivities, auxiliary structures of pumping and compressor stations, collection centers of petroleum and gas, repressurizing and cluster pumping stations, communications centers and much more were developed.

New forms of the organization of construction and installation work have also undergone development--consolidated multiple-skill brigades have been set up, which work under the conditions of the brigade contract and are capable of performing independently the entire set of operations on the installation of block facilities at autonomous construction sites at practically any distance from the production base. The best brigades have increased the amounts of construction and installation work performed by them to 3-6 million rubles a year.

In recent years the complete block method of construction has also been adopted extensively in other petroleum- and gas-producing regions of the country.

Whereas in early 1974 at the Sibkomplektmontazh Association 80 percent of the workers were engaged directly at the construction sites and only 20 percent were engaged at enterprises for the fabrication of block units, now the situation has changed substantially: 20 percent of the workers are engaged in block installation at the construction sites in uninhabited regions, while 80 percent are fabricating the block units at enterprises located in cities.

The national economic efficiency of the complete block method with allowance made for the shortening of the construction time and the acceleration of the placement of the projects under construction into operation amounts to 400,000 rubles per million rubles of capital investments.

This work has by right been nominated for the Lenin Prize.

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